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RZ2.R05020.01.ID.277

August 14, 1998

Mr. Brian Freeman
U.S. Environmental Protection Agency
Region 5 DE-9J
77 West Jackson Boulevard
Chicago, Illinois 60604

Reference: EPA Contract No. 68-W4-0006; Work Assignment No. R05020 QAPP Screening and Development; Manistique Papers, Inc., Hiawatha, MI; EPA ID No. MID981192628; Sampling and Analytical Results Report; Task 06 Deliverable

Dear Mr. Freeman:

Please find enclosed TechLaw's Sampling and Analytical Results Report for the sampling activities that were conducted at the Manistique Papers, Inc. (Manistique Papers) Residuals Management Area (RMA) in Hiawatha, Michigan during the week of June 9 through 12, 1998. Continued assistance with sampling and analysis at the Manistique Papers RMA was requested in your March 24, 1998 Technical Direction memorandum (TDM). Two videotapes documenting sampling procedures and wetlands observations during the June 1998 sampling site visit were submitted to Mrs. Diane Sharrow on June 24, 1998.

A brief discussion of some data from the November 17 through 20, 1997 sampling conducted at the site is also included in this Report. Per Ms. Sharrow's request, an attempt has been made to include in this Report an indication of where the highest levels of potentially hazardous constituents were detected during both the November 1997 and June 1998 sampling site visits.

Please feel free to contact me or Mr. Todd Quillen, the TechLaw Technical Lead, at 312/345-8915 if you have any questions.

Sincerely,

Patricia Brown-Derocher

Patricia Brown-Derocher
Regional Manager

Enclosure

cc: F. Norling, EPA Region 5 (w/out attachment)
D. Sharrow, EPA Region 5
W. Jordan, Central Files
T. Quillen
Chicago Central Files

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SAMPLING AND ANALYTICAL RESULTS REPORT
RESIDUALS MANAGEMENT AREA

MANISTIQUE PAPERS, INC.
EPA ID No. MID981192628

Submitted to:

Mr. Brian Freeman
U.S. Environmental Protection Agency
Region 5 DE-9J
77 West Jackson Boulevard
Chicago, Illinois 60604

Submitted by:

TechLaw, Inc.
20 North Wacker Drive - Suite 1260
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EPA Work Assignment No.	R05020
Contract No.	68-W4-0006
TechLaw WAM	Patricia Brown-Derocher
Telephone No.	312/345-8963
EPA WAM	Brian Freeman
Telephone No.	312/353-2720

August 14, 1998

SAMPLING AND ANALYTICAL RESULTS REPORT
RESIDUALS MANAGEMENT AREA

MANISTIQUE PAPERS, INC.
EPA ID No. MID981192628

1.0 INTRODUCTION

The United States Environmental Protection Agency (U.S. EPA) requested that TechLaw, Inc. (TechLaw) support the Agency in conducting sample collection activities and subsequent sample analysis at the Residuals Management Area (RMA) operated by Manistique Papers, Inc., (Manistique Papers) in Hiawatha, Michigan. Sampling activities involved the collection of waste pile residual material (sludge), soil, surface water, sediment, and groundwater samples which were analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), sulfide, nitrate, total Appendix IX metals, and titanium.

The aforementioned sampling event took place from June 09 through June 11, 1998. The TechLaw field team consisted of Messrs. Todd Quillen, Kevin Higgins, Mark Griffith, and Anthony Mubiru. The following individuals were also present for the sampling event:

Ms. Diane Sharrow (U.S. EPA);
Mr. Hank Sweitzer (Michigan Department of Environmental Quality);
Mr. Jim Cook (Manistique Papers, Inc.);
Mr. Clayton Ebsch (Bittner Engineering, Inc.);
Mr. Mike ___ (Bittner Engineering, Inc.);
Mr. Dave Adams (Coleman Engineering, Inc.); and
Mr. Mark Teste (Coleman Engineering, Inc.).

Coleman Engineering was contracted by TechLaw to collect samples by means of hollow stem auger and hammer-driven split-spoon sample retrieval methods. The field team began by touring the site in order to determine the most appropriate sampling locations, then proceeded to collect samples of waste pile sludge, soil, surface water, sediment, and groundwater. Sampling procedures were conducted in accordance with those presented in the June 08, 1998 Manistique Papers RMA, Site Specific Sampling and Analysis Plan (SAP), with exceptions noted in Section 3.0 below. Appendix A of this report contains Area Maps and Sample Location Maps, Appendix B contains the Photographic Log documenting field observations and Appendix C includes copies of the Field Notes taken by the field team. Appendix D summarizes the analytical results received from the laboratory for the samples collected

2.0 BACKGROUND INFORMATION

Manistique Papers is a manufacturer of various paper products. The company has disposed of paper mill process wastes at the RMA since 1973. The wastes are transported by truck from the company's manufacturing facility to the waste pile at the RMA.

The RMA is a 230-acre site located on a 480-acre property owned by Manistique Papers. Approximately 45-acres of the 230-acres is considered to be under active use, i.e., used for managing residuals from the paper plant. The RMA is located approximately 1.5 miles north of the city of Manistique and is surrounded by heavily wooded land that is owned by Manistique Papers.

The waste pile is an unlined, unengineered above-ground waste management unit estimated to have a thickness ranging from 20 feet in the south to 70 feet in the north. Available file materials indicate that the waste pile covers an area of approximately 23 acres.

The residuals disposed of at the RMA are reportedly dewatered wastewater treatment plant (WWTP) sludges predominantly consisting of unusable paper fibers and clay (89% of the waste disposed at the RMA) and fly ash and bottom ash from the boilers at the mill (10%). Miscellaneous wood and paper wastes such as pallets, shipping material and bales of waste paper are also disposed in the waste pile (<1%). Historical documents report that empty 55-gallon drums may have been disposed in the RMA waste pile in the past. A June 17, 1986 Michigan Department of Natural Resources (MDNR) memorandum states that mill sludges which contained high levels of PCBs from the mill's de-inking lagoon were disposed of in a dumping area identified as the Manistique Pulp and Paper Dump in Hiawatha Township.

The topography surrounding the RMA is generally flat. Standing water has been observed adjacent to the waste pile and water level information collected during TechLaw's November 1997 site visit indicates that groundwater generally occurs at approximately 0.1 to 2.5 feet below ground surface (bgs). The estimated groundwater flow direction across the RMA site is to the northeast at a rate of approximately 55 feet/year based on aquifer parameters discussed in a January 1988 Hydrogeological Study. A former railroad grade, currently Gould's Slough Creek and it's associated wetland, are located 900 feet northeast of the waste pile (see Figure 2 in Appendix A). The subsurface geology at the RMA is generally described in the available file materials as sand overlying fractured, crystalline limestone which occurs at a depth of 5 to 20 feet bgs.

TechLaw conducted a site sampling visit at the RMA on November 17 through 20, 1997. Samples of sludge, soil, sediment, surface water, and groundwater were collected. The analytical results from the sampling event were compared to appropriate media specific screening values and some constituents were detected in samples in excess of the screening values. The results of the November 1997 site inspection are presented in a March 5, 1998 submittal from TechLaw to U.S. EPA. Significant aspects of the sampling results are described here.

- A limited number of VOCs and SVOCs were detected in sludge samples from the waste pile at the RMA in excess of the Generic Soil Screening Levels (Generic SSLs) found in *Soil Screening Guidance: Technical Background Document* (EPA/540/R-95/128; May, 1996).

- Metals including arsenic, barium, chromium, nickel, and selenium were detected in sludge samples in excess of Generic SSLs at a dilution attenuation factor (DAF) of 1 for the migration to groundwater pathway.

- Toluene was detected in one surface water sample at a level of 15.40 ug/l which is significantly less than the U.S. EPA Region 5-specific Ecological Data Quality Level (EDQL) for toluene of 5,000 ug/l.

- VOCs and SVOCs were not detected in any other environmental samples that were collected during the November 1997 site visit.

- Copper was detected in excess of the EDQL in three surface water samples and mercury was detected in one sediment sample at a level equal to the EDQL of 0.174 mg/kg.

- Concentrations of metals in the groundwater in a well point location directly downgradient of, and close to, the waste pile were elevated relative to other groundwater samples that were collected. Lead was detected in this groundwater sample in excess of Safe Drinking Water Act "action levels".

3.0 SAMPLING PROCEDURES

During the June 1998 site sampling visit, the field team began by touring the site in order to determine the most appropriate sampling locations, then proceeded to collect samples of waste pile sludge, soil, surface water, sediment, and groundwater for various parameters according to the procedures discussed below.

A. Waste Sampling at the Paper Mill

As indicated in the table below, TechLaw collected one sample of waste from the Manistique Papers paper mill facility in Manistique, Michigan. The sample was taken directly from the WWTP filter press, the source of the sludges that are disposed of at the RMA, just prior to the material falling from the filter press into the container that is used to transport the sludges to the RMA.

The filter press sample (PRS-1) was collected using a stainless steel spoon and stainless steel bowl. The sample, which was analyzed for TCLP VOCs, SVOCs, TCLP Metals, PCBs, Appendix IX metals and titanium, was put into preservative-free glass containers. The sample was packaged and shipped to Quanterra in North Canton, Ohio in accordance with the shipping and custody procedure outlined in the TechLaw Region 5 Generic Quality Assurance Project Plan (QAPP).

Sample No.	Time	Parameters to be analyzed	Remarks
PRS-1 (8 oz. jar)	0920	TCLP VOCs, SVOCs, TCLP Metals, SVOCs, PCBs, total Appendix IX metals and titanium	Sample was grey and had a wet papery appearance.

B. Waste Pile Sampling

A hollow stem auger was used to collect waste samples from four borings within the waste pile at the RMA. A total of 16 samples were collected from the four borings. The sampling locations are shown in Figure 4 (Appendix A) and their approximate geographic coordinates (based on an uncompensated hand held Global Positioning System [GPS] unit) are listed in the table below.

Boring	Latitude	Longitude
SLG-6	45° 59.21 N	086° 15.11 W
SLG-7	45° 59.17 N	086° 15.13 W
SLG-8	45° 59.20 N	086° 15.08 W
SLG-9	45° 59.12 N	086° 15.23 W

The borings were continuously sampled using a split spoon to two feet below the soil contact underlying the waste pile. The only exception to this is that boring SLG-9 was not sampled from 0 to 25 feet below ground surface (bgs) in order to expedite the drilling process. This decision was made based on sampling objectives, acquired knowledge of the waste, and in the interest of expediting the drilling process.

The physical description of the waste samples from each boring was recorded and samples were screened with a photo-ionization detector (PID) following the procedures detailed in the TechLaw Region 5 Generic QAPP. Visual observations of physical characteristics such as color, grain size, moisture content, and odor were also used in selecting sampling depths and parameters. These observations are documented in the table below. PID screening was done in order to aid in identifying samples to be analyzed for VOCs and SVOCs. Three waste sludge samples were collected from each boring based on the results of PID screening and visual observations of the waste material. One soil sample from the bottom of each boring, immediately beneath the waste pile, was also collected for laboratory analysis. All 12 of the samples collected from the waste pile were analyzed for PCBs. Seven waste pile samples were analyzed for VOCs, six for SVOCs, four for TCLP metals, and 17 samples for total Appendix IX metals (plus titanium). The VOC samples were collected using an En-Core sampling device in accordance with SW-846 Method 5035 following the draft TechLaw SOP on this procedure. The waste and soil samples were packaged and shipped to Quanterra Incorporated's laboratory facility in North Canton, Ohio in accordance with the shipping and custody procedure outlined in the TechLaw Region 5 Generic QAPP.

Boring Number/ Boring Depth	Parameters Analyzed	Remarks
SLG-6(16-18)	VOCs, SVOCs, PCBs, TCLP metals, Appendix IX metals and titanium	Papery grey sludge, PID = 0.0 - 6.7 ppm
SLG-6(38-40)	PCBs	Top foot consisted of grey colored water and bottom 1.5 ft consisted of papery grey sludge. PID = 0.0 - 4.3 ppm.
SLG-6(48-50)	VOCs, SVOCs, PCBs, TCLP metals, Appendix IX metals and titanium	Top foot consisted of water mixed with boiler ash and bottom foot consisted of very wet grey, papery sludge. Sample contained pieces of what appeared to be chain link fence material. PID = 0 - 1.2 ppm
Soil-6(57.5- 59)	SVOC, PCBs, Appendix IX metals and titanium	Dark, loamy soil. Had pieces of chain link fence. No PID reading was taken.
SLG-7(32-34)	VOCs, SVOCs, PCBs, TCLP metals, Appendix IX metals and titanium	Grey papery sludge. PID = 0.5 - 12.3 ppm.
SLG-7(38-40)	PCBs	Top foot consisted of grey papery sludge mixed with woody material. Bottom foot consisted of dark ash. PID = 0 - 10.8 ppm.
SLG-7(48-50)	PCBs, TCLP metals, Appendix IX metals and titanium	Top foot consisted of grey sludge and bottom half foot consisted of darker, woody material. PID = 0.2 - 4.8 ppm.
Soil-7(51.5-53)	VOCs, SVOCs, PCBs, Appendix IX metals and titanium.	See video.
SLG-8(31-33)	PCBs, TCLP metals, Appendix IX metals and titanium	Boiler ash consisting of medium to coarse grains. PID = 0
SLG-8(47-49)	PCBs	Top 1.5 foot consisted of grey papery sludge & bottom half foot consisted of a mixture of the grey sludge and dark boiler ash. PID = 0.0 - 1.0 ppm.
SLG-8(51-53)	PCBs, TCLP metals, Appendix IX metals and titanium	Top 1.5 foot consisted of grey papery sludge and bottom half foot consisted of a mixture of the grey sludge and dark boiler ash. PID = 0.0 - 1.0 ppm.
DUP-21	PCBs, Appendix IX metals and titanium	See SLG-8(51-53) above

Boring Number/ Boring Depth	Parameters Analyzed	Remarks
Soil-8(57-59)	PCBs, Appendix IX metals and titanium	Grey papery sludge on top of a layer of light brown, fine to medium sand. PID = 0.1 - 5.5 ppm
SLG-9(24-26)	VOCs, PCBs, TCLP metals Appendix IX metals and titanium	Top half foot consisted of grey water and the bottom 1.5 feet consisted of wet, grey papery sludge. PID = 1.0 - 23.9 ppm.
SLG-9(32-34)	PCBs	Wet, grey papery sludge. PID = 3.0 - 7.7 ppm.
SLG-9(34-36)	VOCs, SVOCs, PCBs, TCLP metals, Appendix IX metals and titanium	Wet, grey papery sludge. PID = 3.0 - 21.2 ppm.
DUP-22	SVOCs, Appendix IX metals and titanium	See SLG-9(34-36) above
Soil-9(38-40)	VOCs, PCBs, TCLP metals Appendix IX metals and titanium	Fine sandy soil. No PID reading was taken.

C. Surface Water and Sediment Sampling

Surface water and co-located sediment samples were collected from four locations around the waste pile. The sampling stations were determined in the field based on previous sampling data and ecological factors. The sampling locations were identified as SW-1/SED-1 through SW-4/SED-4. The approximate sampling station locations are indicated on Figure 4 (Appendix A).

Temperature, conductivity and pH measurements were taken at each surface water sampling location. The readings for each of the locations are listed in the table below.

Location	Temperature (°F)	Conductivity (mOhms/cm) or (mSiemens/cm)	pH
SW-1	64	395 uS	6.55
SW-2	60	175 uS	5.95
SW-3	60	810 uOhms	7.25
SW-4	70	1090 uOhms	6.91

Surface water samples were collected by submerging pre-cleaned disposable beakers into the surface water and filling the sample containers from the beaker. Depending on accessibility and depth of surface water, the sediment samples were collected using a pre-cleaned stainless steel trowel/spoon or a stainless steel hand auger.

The surface water samples were analyzed for VOCs and total Appendix IX metals (plus titanium) while the sediment samples were analyzed for PCBs, SVOCs and total Appendix IX metals (plus titanium), since these constituents would more likely be bound to sediments than in solution. The table below contains a summary of surface waster and sediment sample locations, and analytical parameters requested.

Sample No./Location	Parameters Analyzed
SW-1	VOCs, Appendix IX metals and titanium
SW-2	VOCs, Appendix IX metals and titanium
SW-3	VOCs, Appendix IX metals and titanium
SW-4 (& DUP-11)	VOCs, Appendix IX metals and titanium
SED-1	SVOCs, PCBs, Appendix IX metals and titanium
SED-2	SVOCs, PCBs, Appendix IX metals and titanium
SED-3	SVOCs, PCBs, Appendix IX metals and titanium
SED-4 (& DUP-11)	SVOCs, PCBs, Appendix IX metals and titanium

The surface water and sediment samples were packaged and shipped to Quanterra Incorporated's laboratory facility in North Canton, Ohio in accordance with the shipping and custody procedure outlined in the TechLaw Region 5 Generic QAPP.

D. Groundwater Sampling

Ten groundwater monitoring wells were installed by the facility in the area surrounding the RMA in November 1997 shortly after the November 17 through 20, 1997 site sampling visit. Based on groundwater flow estimates and previous analytical results, monitoring well W-4R (screened in sand from 13-15.5 feet) was sampled as a background location. Monitoring well SR-1 (screened in weathered bedrock from 24.5-29.5 feet) was sampled because it is the only shallow bedrock monitoring well present at the site. Monitoring well OB-10 (screened from 13-15.5 feet in sand) was sampled based on it's proximity to the southern portion of the waste pile and OB-14 (screened from 2.5-4.5 feet in sand) was sampled based on it's location downgradient of the waste pile.

The wells were purged of three to five groundwater well volumes and sampled using a pre-cleaned disposable bailer. Groundwater samples were analyzed for VOCs, SVOCs, PCBs, total Appendix IX metals plus titanium, sulfide, and nitrate/nitrite. As indicated in the table below, TechLaw also measured the pH, temperature and conductivity of the water from each well.

Well	Water Level (feet below top of well casing)	Depth (feet below top of well casing)	Volume (gal/well volume)	pH	Temp. (°F)	Conductivity (uS/cm)
OB-10	5.6	18.1	2.1	7.15	58	520
W-4R	3.6	18.2	2.5	7.61	61	2.97
SR-1	7.0	32.25	4.17	6.49	48.2	315
OB-14	2.6	6.8	0.7	6.69	51	890

The groundwater samples were packaged and shipped to Quanterra Incorporated's laboratory facility in North Canton, Ohio in accordance with the shipping and custody procedure outlined in the TechLaw Region 5 Generic QAPP.

E. Quality Control Samples

Split samples were collected from all sampling locations by Manistique Papers' associated consultants, Bittner Engineering, Inc.

The quality control samples collected during this sampling event consisted of field duplicates, matrix spike/matrix spike duplicates (MS/MSD), equipment blanks, and trip blanks.

Field Duplicates

DUP-10 was collected as a field duplicate for groundwater at the monitoring well W-4R. The sample was analyzed for VOCs, SVOCs, PCBs, Appendix IX metals (plus titanium), nitrites/nitrates, and sulfides.

DUP-11 was collected from the same sampling location as SW-4/SED-4 as a duplicate. It was analyzed for VOCs, SVOCs, PCBs, and Appendix IX metals (plus titanium).

DUP-21 was collected from the SLG-8(51-53) as a field duplicate and analyzed for the presence of PCBs and Appendix IX metals (including titanium).

DUP-22 was collected from the SLG-9(34-36) as a field duplicate and analyzed for the presence of SVOCs.

Matrix Spike/Matrix Spike Duplicates (MS/MSDs)

SR-1 was collected to serve as MS/MSD samples for groundwater, and analyzed for VOCs, SVOCs, PCBs, Appendix IX metals (plus titanium), nitrates/nitrites, and sulfides.

SLG-9(34-36) was collected from the waste pile to serve as MS/MSD for VOCs.

An MS/MSD sample was obtained for the surface water/sediments sampling location SW-3/SED-3. It was analyzed for the presence of VOCs, SVOCs, PCBs, Appendix IX metals (including titanium).

Following the validation of the analytical data, it appears that all necessary MS/MSDs were analyzed by Quanterra during the analysis of these samples.

Equipment Blanks

Equipment blanks were collected from the following sampling equipment: groundwater bailer; surface water sample beaker, spoon and bowl; and the drill rig split spoon. Duplicates and equipment blanks were analyzed for the same constituents as the associated samples.

EB-1 was collected as the equipment blank sample from the groundwater bailer. It was analyzed for the presence of VOCs, SVOCs, PCBs, Appendix IX metals (plus titanium), nitrates/nitrites, and sulfides.

EB-2 was collected as the equipment blank of the drill rig split spoon used in collecting waste pile samples. This sample was analyzed for the presence of VOCs, SVOCs, PCBs, and Appendix IX metals (including titanium).

EB-3 was collected as the equipment blank for the surface water and sediment sampling. It was collected from the bowl and spoon used in collecting the SW-3/SED-3 samples following decontamination. The sample was analyzed for the presence of VOCs, SVOCs, PCBs, and Appendix IX metals (including titanium).

Trip Blanks

Two sets of trip blanks, TB-1 and TB-2, consisting of analyte-free, deionized water, were prepared by the laboratory, shipped to the sampling site, and placed in coolers and handled in the same manner as all aqueous VOC samples. The trip blanks were analyzed for VOCs.

F. Sample Packaging and Shipment

The samples collected during the above-described sampling events were shipped in batches. The sample containers were labeled, tagged, bubble wrapped, placed into plastic bags and then placed into iced coolers. The ice in the coolers was double wrapped in ziplock bags. Chain of custody forms were completed and signed and the sample coolers were then sealed with custody seals. The sample coolers were shipped to the to the laboratory with Federal Express as the courier.

G. Investigation Derived Waste

Investigation derived waste (IDW) was drummed, stored on site with permission from Mr. Jim Cook of Manistique Papers and prepared for shipment under manifest by a hazardous waste transporter under the supervision of a TechLaw representative. It was removed from the site on July 1, 1998 by Superior Special Services of Port Washington, Wisconsin. Mr. Michael Powers of TechLaw was present during the removal of the IDW from the site.

4.0 ANALYTICAL RESULTS

4.1 Data Validation Results

The following are TechLaw's comments on the data for the RMA project, broken down by analyses. A copy of the validated data package has been retained by TechLaw and is readily available to U.S. EPA upon request.

VOCs

The data for VOC analyses were validated according to *U.S. EPA Contract Laboratory Program National Functional Guidelines for Organic Data Review,* February 1994. The data meet the criteria established in this document.

Acrolein, acetone, acetonitrile, 1,4-dioxane, 1,2,3-trichlorobenzene, 1,2,4-trichlorobenzene, napthalene, propionnitrile, bromomethane, vinyl acetate, 2-butanone, 4-methyl-2-pentanone, 2-hexanone, acrylonitrile, 1,4-dichloro-2-butene, and dichlorodifluoromethane did not always meet initial and/or continuing calibration criteria. Affected samples are flagged with a "J".

Samples SW-3, SW-4, Dup-11, EB-2, TB-3, SW-1, TB-2, OB-14, ans SR-1 were received with air bubbles in the 40 mL vials. Additionally samples SW-3, SW-4, Dup-11, and OB-14 had pH values above 2. Since the laboratory did not record if all vials for these samples contained headspace and/or insufficient preservative, all VOC data associated with the above samples are flagged with a "J".

Chlorobenzene and dichlorobenzene methylene chloride, and acetone were detected in some method blanks. These compounds were not detected in any associated samples.

The data for sample SLG-6(16-18) are flagged since all surrogates were below acceptable levels.

The following is a list of data flags which appear in the VOC result tables:

J Sample concentration is estimated.
U Analyte undetected at the specified level.

SVOCs

The data for SVOC analyses were validated according to *U.S. EPA Contract Laboratory Program National Functional Guidelines for Organic Data Review,* February 1994. The data meet the criteria established in this document.

Famphur, p-phenylenediamine, n-nitroquinoline-1-oxide, hexachlorocyclopentadiene, 2-napthylamine, methylpyrilene, and a,a-dimethylphenethylamine did not always meet initial and/or continuing calibration criteria. Affected samples are flagged with a "J".

The following is a list of data flags which appear in the SVOC results tables:

U	Sample is undetected at the reporting level
J	Sample concentration is estimated.
#	2-Methylphenol and 3-methylphenol results are flagged with a "#" to note that they coelute and cannot be distinguished using the applied analysis.

PCBs

The data for PCB analyses were validated according to *U.S. EPA Contract Laboratory Program National Functional Guidelines for Organic Data Review,* February 1994. The data meet the criteria established in this document.

The results for sample SLG-6(38-40), analyzed on June 21, 1998, were flagged with a "J" since both surrogates were above acceptable levels. The following is a list of data flags which appear in the PCB results tables:

U	Analyte undetected at the specified level.
J	Sample concentration is estimated.

Metals Analyses

The data for metals analyses were validated according to *U.S. EPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review,* February 1994. The data meet the criteria established in this document.

All samples were prepared and analyzed within holding time except Soil-9(38-40). The mercury sample preparation for Soil-9(38-40) was analyzed five days after the holding time had expired. Therefore, the mercury result for this sample is flagged with a "J".

Method blank contamination occurred. All affected sample results are flagged with either "MBB" or "MBD" as defined below.

The following is a list of data flags which appear in the metals result tables:

J	Sample concentration is estimated.
U	Analyte undetected at the specified level.

General Chemistry

The general chemistry data were validated according to *U.S. EPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review,* February 1994. The data meet the criteria established in this document.

The following data flag applies to all sulfide analyses. The data are flagged due to poor analyte recoveries in the matrix spike and duplicate.

J Sample concentration is estimated.

4.2 Discussion of Results

Analytical results summary tables for the samples that are the subject of this report are included in Appendix D. The analytical results were compared to several established screening criteria as appropriate considering media, compound, and analytical method. The screening tools that were used include the following:

- Appendix A of the *Soil Screening Guidance: Technical Background Document* (EPA/540/R-95-128; May 1996)(Generic SSLs),
- 40 CFR 261.24 TCLP regulatory limits,
- Federal Maximum Contaminant Levels (MCLs),
- Appendix A of U.S. EPA Region 5-specific Ecological Data Quality Levels (EDQLs) Final Report (August, 1996), and
- U.S. EPA Region III Risk Based Concentrations (RBCs).

Not all detected compounds are discussed in the following section. The discussion that follows is provided to focus attention on compounds which approach, or exceed, established screening criteria.

A. Waste Samples from the Paper Mill

Methyl ethyl ketone (MEK) was detected through TCLP analysis in sample PRS-1 at an estimated concentration of 0.063J mg/L. This level is significantly below the TCLP regulatory level of 200 mg/L established in 40 CFR 261.24 for this compound. No TCLP metals results exceeded established TCLP regulatory levels. *bis*(2-Ethylhexyl)phthalate was detected at a concentration of 2800J ug/Kg yet due to the common occurrence of this compound as a laboratory artifact, the detection of this compound is not believed to be representative of this sample. No PCBs were detected in sludge sample PRS-1 and the results of the analysis for total metals did not indicate any metals at concentrations above established screening levels.

B. Waste Pile Samples

Waste pile sample analytical results were compared to Generic SSLs. Generic SSLs are not listed for cobalt, copper, titanium or tin.

Lead was detected in sample SLG-9(34-36) at a level of 469 mg/Kg and Dup-22 (a duplicate of sample SLG-9(34-36)) at a level of 328 mg/Kg. The Generic SSL (ingestion) for lead is 400 mg/kg.

Arsenic was detected above the 0.4 mg/Kg Generic SSL (ingestion) screening level in samples Dup-21 (a duplicate of sample SLG-8(51-53)) at 2.4 mg/Kg, SLG-8(31-33) at 4.9 mg/Kg, and Soil-9(38-40) at 1.8 mg/Kg. Additionally, concentrations qualified as estimates were reported at the Generic SSL for arsenic in many other samples as shown in Appendix 4.

The 0.1 mg/Kg beryllium Generic SSL (ingestion) was exceeded in several results qualified as estimates including SLG-8(31-33) at 0.64B, SLG-8(51-53) at 0.26B, and SLG-6(48-50) at 0.28 mg/Kg.

Several samples were found to contain levels of metals above the Generic SSLs migration to groundwater levels with a dilution attenuation factor equal to one (DAF=1) for arsenic, beryllium, chromium, nickel, and selenium.

The PCB Aroclor-1242 was detected in sample SLG-9(24-26) at a level of 1300 µg/Kg, SLG-9(34-36) at a level of 590 µg/Kg, SLG-9(32-34) at a level of 320 µg/Kg, SLG-7(38-40) at a level of 240 µg/Kg, Soil-6(57.5-59) at a level of 240 µg/Kg, and SLG-6(48-50) at a level of 120 µg/Kg. No PCB aroclors were detected in any other waste pile samples. The U.S. EPA Region III RBC for Arochlor 1242 is 320 µg/Kg for a residential scenario.

Phenol, 2-methylphenol, 3-methylphenol, 4-methylphenol, and 2-methylnapthalene were detected in several samples from the waste pile. The Generic SSL for phenol (5,000 µg/Kg for a DAF=1) was exceeded in Sample SLG-7(32-34) at 6800 µg/Kg. The Generic SSL for 2-methylphenol (800 µg/Kg for a DAF=1) was exceeded by sample SLG-7(32-34) at 3100J µg/Kg. No other detects were greater than the applied screening levels.

No VOCs were detected in waste pile samples greater than applied screening levels.

C. Surface Water and Sediment Samples

Zinc (EDQL=0.0276 mg/L) was detected in surface water samples at levels exceeding EDQLs in samples SW-1, SW-2, and SW-4. Mercury (EDQL=9.74 x 10^{-7} mg/L) was detected in surface water samples at levels exceeding EDQLs in samples SW-2, SW-3, and SW-4. Copper (EDQL=0.00214 mg/L) was detected in surface water samples at levels exceeding EDQLs in samples SW-2 and SW-4 and lead (EDQL=0.0013 mg/L) was detected at levels exceeding EDQLs in sample SW-2.

No VOCs were detected at levels approaching applied screening criteria.

No SVOCs or PCBs were detected in the sediment samples collected from the Manistique Papers RMA. Sediment sample Sed-4 result approached the EDQLs for copper (16 mg/Kg) and, based on a qualified concentration, exceeded the EDQL for mercury (0.174 mg/Kg).

D. Groundwater Samples

No compounds were detected in groundwater samples at levels approaching applicable MCLs.

5.0 WETLANDS OBSERVATIONS

5.1 Wetlands Definition

According to the definition of wetlands provided in 33 CFR 328.3(b), areas are determined to be wetlands if they are "inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions." The criteria for wetland determination, according to this definition, are associated with the vegetation, soils, and hydrology of a particular area.

5.2 Scope of the Investigation

A preliminary wetlands investigation was conducted at Manistique Papers RMA to determine whether wetlands may be present at the site. U.S. Army Corps of Engineers wetland delineation guidelines and procedures were applied. The wetlands investigation was conducted by Mr. Mark Griffith of the TechLaw field team.

The scope of the wetlands investigation was to perform field activities similar to those employed in conducting a Routine, Level 2 wetlands delineation in those areas at the site which exhibit potential wetlands characteristics, according to the procedures outlined in the 1987 Corps of Engineers Wetlands Delineation Manual (Technical Report Y-87-1) (hereafter referred to as the 1987 Manual). Routine determinations involve simple, readily applied field methods. Level 2 determinations are employed when there is insufficient information already available to characterize the vegetation, soils, and hydrology of the entire project area.

Field activities consisted of 1) visual characterization of vegetation communities in each suspect study area, 2) identification of vegetative strata within each community, 3) selection of one representative observation point within each community, 4) determination and identification of dominant plant species within each stratum of each community, 5) characterization of soil conditions to a depth of 20 inches at each observation point (as appropriate, depending on hydrology conditions), and 6) determination of whether indicators of wetland hydrology are present at each observation point.

5.3 Limitations

Certain limitations are inherent in the methodology employed in this investigation. The routine method to determine whether hydrophytic vegetation is present at a site consists of visual characterization of vegetation communities and visual observation to determine dominant plant species. Such visual characterizations impart a certain degree of subjectivity to the process, which is dependent upon professional judgment.

Seasonal considerations also factor into wetland evaluations based on vegetative elements. The potential exists for the floristics of the study area to vary throughout the growing season. Identification of grasses and sedges was not conducted during this investigation, due to the absence of primary identification features such as reproductive parts.

5.4 Environmental Setting of the Site

5.4.1 Soils

The majority of the study site is comprised of the low-lying areas surrounding the residuals pile. The soil types present at the study site (as mapped on the Soil Conservation Service [SCS] soil survey of Schoolcraft County, Michigan) are Au Gres series soils (primarily south and east of the residuals pile) and Roscommon series soils. The Roscommon series is listed as a Hydric Soil in the U.S. Department of Agriculture SCS document entitled Hydric Soils of the United States (National Technical Committee for Hydric Soils, 1991). The presence of the sandy Au Gres series was verified by field observations southeast of the residuals pile. The presence of the sandy Roscommon series was verified by field observations southwest of the residuals pile.

5.4.2 Surface water

The study site is situated approximately one-quarter mile southwest of Gould's Slough, and approximately one mile west of the confluence of Gould's Slough and the Manistique River.

5.5 Wetland Investigation Method

5.5.1 Preliminary data gathering

The following documents were used prior to and during the field activities portion of this investigation.

- Wetland Plant Database (U.S. Fish and Wildlife Service) - The *National List of Plant Species That Occur In Wetlands: 1988 National Summary* was used to determine the wetland indicator status of each dominant plant species identified at observation points throughout the study site. The list is arranged using both scientific names and common names and provides a wetland indicator designation for each listed species. These indicator designations were ultimately used to determine whether each plant community at the study area is hydrophytic.

- Soil Survey (U.S. Department of Agriculture Soil Conservation Service) - The soil survey for Schoolcraft County, Michigan (unknown date) was used to determine the soil types that have been mapped at the study site.

- *Hydric Soils of the United States* (National Technical Committee for Hydric Soils, 1991) - The list of hydric soils was used to determine whether the soil types mapped on the soil survey are listed as hydric soils.

- Aerial Photographs - Aerial photographs maintained at the former Soil Conservation Service (currently the Natural Resources Conservation Service) and the Wyman State Forestry Nursery were reviewed to determine that significant land use changes have not occurred at the study site for the past 13 years, other than enlargement of the residuals pile.

- Site Survey Map - The survey map includes cartographic features, such as one-foot and five-foot contour intervals and the residuals pile, and was produced at a scale of one inch to 200 feet. The survey map was used in the field to map the locations and distributions of the vegetation communities.

- Field Guides - Various plant identification keys, manuals, and handbooks, and Munsell Soil Color Charts were used in the field to characterize plants and soils at the study site.

5.5.2 Routine on-site inspection

Procedures similar to those used for a routine on-site determination as outlined in Section D (Subsection 2) of the 1987 Manual were implemented at the site. These procedures are provided in the following text in the stepwise manner in which they were implemented.

One of the initial procedural steps of the routine on-site method is to determine whether an atypical situation exists. In the case of the study site, there may be evidence that human activities have altered the natural surface water and shallow groundwater hydrology in the northeast corner of the site; specifically, the construction of the former railroad bed northeast of the residuals pile may act as a dam-like structure that may impede surface water and groundwater flow toward Gould's Slough. In addition, the presence of the residuals pile by itself may exert some influence on the hydrology of the site. These issues, however, are beyond the scope of this investigation. Therefore, the investigation process returned to the procedures outlined in Section D (Subsection 2) of the 1987 Manual for characterization of vegetation, soils, and hydrology.

Although the study site is greater than five acres in size, the site-specific conditions were not conducive to establishment of transects. Therefore, the site was traversed on foot, and discrete plant communities in each suspect area were identified through visual evaluation. Each community was assigned a name and a number, and the location and distribution of each community was sketched onto the base map.

It was determined that normal environmental conditions were likely present at the study site. Vegetation communities and the hydrology of the study area observed during the field activities do not appear to have been influenced by abnormal precipitation.

One representative observation point was selected within each plant community. At each observation point, the dominant plant species in each vegetation layer within the immediate vicinity was visually determined. Dominance was determined according to the criteria provided in Step 20 of Section D (Subsection 2) of the 1987 Manual. Plant species were identified using various plant identification keys, manuals, and handbooks. The indicator status of each dominant species was determined from the National List of Plant Species That Occur In Wetlands: 1988

National Summary (U.S. Fish and Wildlife, 1988). A determination was made as to whether the majority of dominant vegetative species had an indicator status of Facultative Plant (FAC), Facultative Wetland Plant (FACW), or Obligate Wetland Plant (OBL). Information pertaining to dominant plant species and corresponding indicator status was recorded on a data form for each observation point, and a determination was made whether hydrophytic vegetation was present. The results of these determinations are presented in Section 4.0.

Each plant community was examined for the presence of positive indicators of wetland hydrology. Indicators of wetland hydrology were determined according to the criteria provided in Part III, Paragraph 49. Findings were recorded on the data forms, and determinations were made whether wetland hydrology was present. The results of these determinations are presented below.

As indicated in the 1987 Manual, hydric soils can be assumed to be present at a given observation point if either of the following situations was observed:

(a) All dominant plant species had an indicator status of OBL; or

(b) All dominant plant species had an indicator status of OBL and/or FACW, and at least one dominant plant species had an indicator status of OBL.

A soil pit was excavated at two of the six observation points (i.e., only at observation points that were not inundated). The soil immediately below the organic layer was examined for hydric soil indicators (as described in Part III, Paragraph 44 of the 1987 Manual). The fundamental elements of the 1987 Manual soil characterization procedures were addressed, including evaluation for the presence of high organic content in the surface horizon, organic streaking in the subsurface horizons, and whether the site soils are included on the list of <u>Hydric Soils of the United States</u> (National Technical Committee for Hydric Soils, 1991). Indicators requiring field chemical analyses (e.g., testing for reducing conditions) were not evaluated. The soil profile at each excavation was also compared to the descriptions provided in the SCS soil survey. The findings of these evaluations were recorded on the appropriate data form. A determination was made as to whether a positive hydric soil indicator was present at each observation point. The results of these determinations are presented in Section 6.0 below.

Based on information recorded on the data forms, a wetland determination was made for each observation point. An observation point was determined to be a wetland if all three parameters had wetland indicators.

5.6 Vegetation Data (Principal Plant Communities)

The following text provides a brief description of the principal plant community in each suspect area. Included in the following descriptions is an indication of whether the community satisfies the hydrophytic vegetation criterion (i.e., greater than 50 percent of the dominant species identified within the community have indicator classifications of OBL, FACW, or FAC).

Community No. 1: Mixed Woodlands Swamp. This community is present immediately south and southwest of the residuals pile (Observation Station No. 1). The tree layer provides a partially open canopy, and is dominated by white pine (*Pinus strobus*), quaking aspen (*Populus tremuloides*), tamarack (*Larix laricina*), and black spruce (*Picea mariana*). The sapling/shrub community is dominated by speckled alder (*Alnus rugosa*) (known locally as tag alder) and black willow (*Salix nigra*). The herbaceous layer is very diverse, and appears to be dominated by a variety of grasses and sedges, horsetail (*Equisetum arvense*), a rush (*Equisetum* spp.), ferns (*Onoclea* and *Cystopteris* spp.), and cattail (*Typha angustifolia*). This community appears to satisfy the hydrophytic vegetation criterion.

Community No. 2: Mixed Willow/Cattail Swamp. This community is present immediately southwest of the residuals pile (Observation Station No. 2). This community is dominated by black willow and cattail. This community appears to satisfy the hydrophytic vegetation criterion.

Community No. 3: Mixed Willow/Grass Swamp. This community is present immediately west of the residuals pile (Observation Station No. 3). This community is dominated by black willow and marsh grass (possibly a sedge). This community appears to satisfy the hydrophytic vegetation criterion.

Community No. 4: Conifer Woodland. This community is present immediately southeast of the residuals pile (Observation Station No. 4). This community is dominated by white cedar, tamarack, black spruce, and red maple (*Acer rubrum*). The conifers provide a closed canopy. Vegetation on the forest floor is sparse, and is dominated by ferns and red maple seedlings. This community appears to satisfy the hydrophytic criterion.

Community No. 5: Cedar Swamp. This community is present immediately east of the residuals pile (Observation Station No. 5). This community is dominated by white cedar, yellow birch (*Betula alleghaniensis*), speckled alder, tamarack, black spruce, and red maple. The trees provide a partially open canopy. Saplings are dominated by speckled alder and red maple. Vegetation on the forest floor is fairly sparse, and is dominated by ferns and red maple seedlings. This community appears to satisfy the hydrophytic criterion.

Community No. 6: Mixed Willow/Shrub Swamp. This community is present immediately northeast of the residuals pile (Observation Station No. 6). This community is dominated by black willow and shrubby cinquefoil (*Potentilla fruticosa*). The herbaceous layer is diverse, consisting of various grasses, sedges, cattail, blueflag (*Iris versicolor*), and cowslip (*Caltha palustris*). This community appears to satisfy the hydrophytic vegetation criterion.

5.7 Hydrology Data

Wetland hydrology indicators were present at five of the six observation stations. Inundation and soil saturation were the primary indicators present at all observation stations except number 4. Consequently, it was determined that wetland hydrology was present at all observation stations except number 4.

5.8 Soil Data

Generally, the soils throughout the study site were comprised of sandy soils similar to the SCS descriptions. At all observation stations except number 4, a thick organic layer was present in the surface horizon. Therefore, it was determined that hydric soils are present at all observation stations except number 4.

6.0 CONCLUSIONS

6.1 Sampling Results

During the June 9 through 12, 1998 site sampling visit at the RMA, metals, SVOCs and PCBs were detected in waste pile samples at concentrations greater than applicable screening levels. Surface water EDQLs for copper, lead, mercury and zinc were exceeded by surface water samples collected from areas surrounding the RMA and copper and mercury were detected at levels close to the sediment EDQLs. No compounds were detected in groundwater samples at levels approaching MCLs.

Upon careful review of the analytical data from the June 1998 site sampling visit and the previous November 1997 site sampling visit, no trends were recognized with respect to the distribution of contaminants with depth or boring location within the waste pile. Some elevated levels of metals such as copper were detected in sediment samples collected from the area immediately surrounding the waste pile. Based on analytical results from groundwater samples GW-2 (November 1997) and OB-14 (June 1998) very low levels of VOCs (toluene in GW-2 and benzene in OB-14) are present in the groundwater in an area that appears to be downgradient of the waste pile.

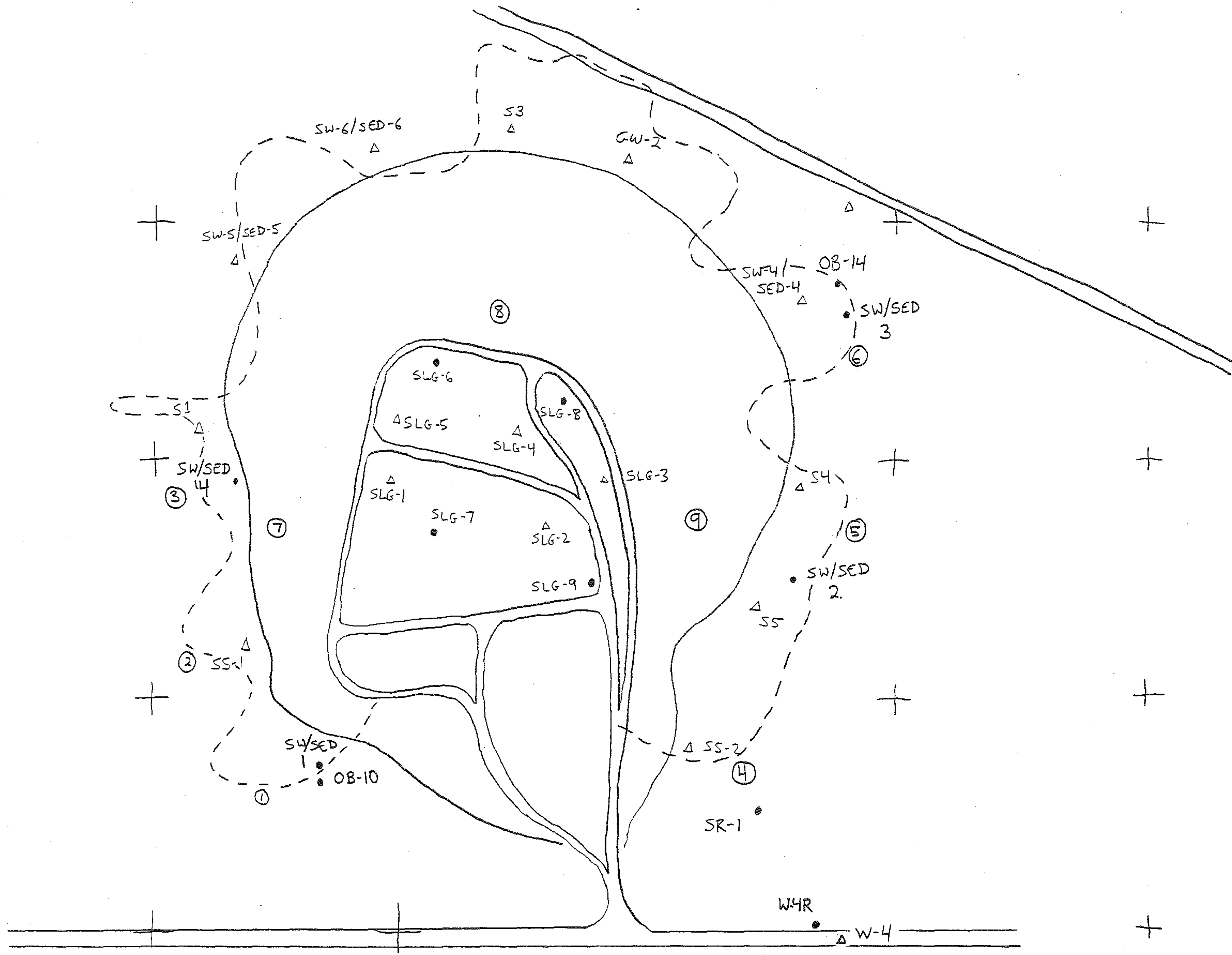
6.2 Wetlands

The study site was comprised of the areas immediately surrounding the residuals pile. Wetland criteria were satisfied at observation stations numbers 1, 2, 3, 5, and 6. Neither wetland hydrology indicators nor hydric soil indicators were present at observation station number 4, located southeast of the residuals pile. The area northwest of the residuals pile was not evaluated, since field observations indicated that residuals had been deposited to some degree in that area, and that the ground surface was slightly built-up due to the deposition.

The estimated acreage of the area that satisfies wetland criteria is approximately 10 to 12 acres.

APPENDIX B

PHOTOGRAPHIC LOG



N

200 0 200
Approximate Scale
Feet

• June 9-12, 1998 Sampling Locations

Δ November 17-20, 1997 Sampling Locations

+ Property identification (Section ¼'s) Grid.

- - - ① Wetland observation walk-through path and observation stations

Figure 4
Sample Location Map

06/03/1998 16:15 9067899977 BITTNER ENGINEERING PAGE 48

SHEET 1/2

SHEET 2/2

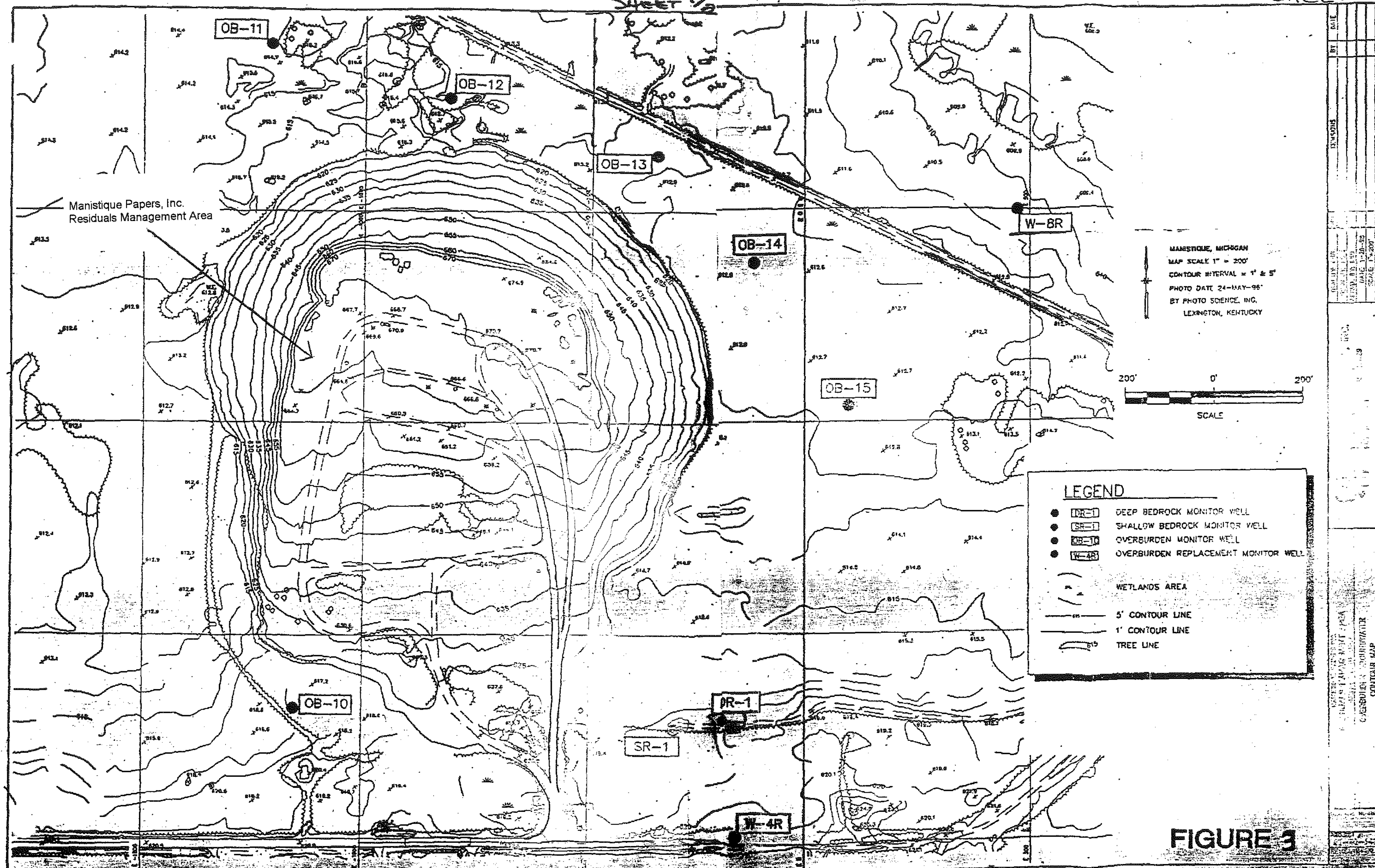
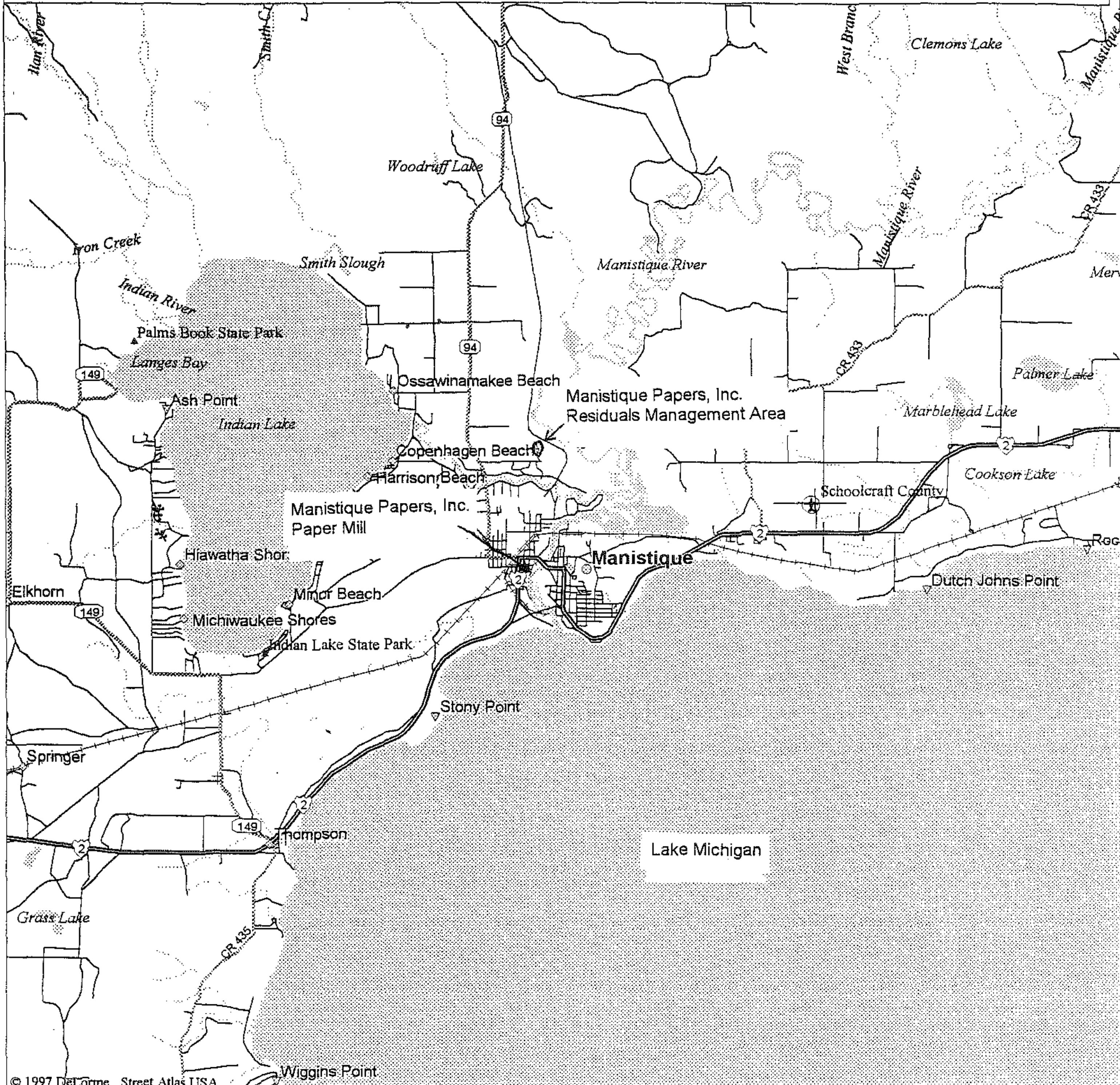


FIGURE 3

APPENDIX A

AREA MAPS AND SAMPLE LOCATION MAPS

Figure 1: Manistique Papers, Inc. Area Map

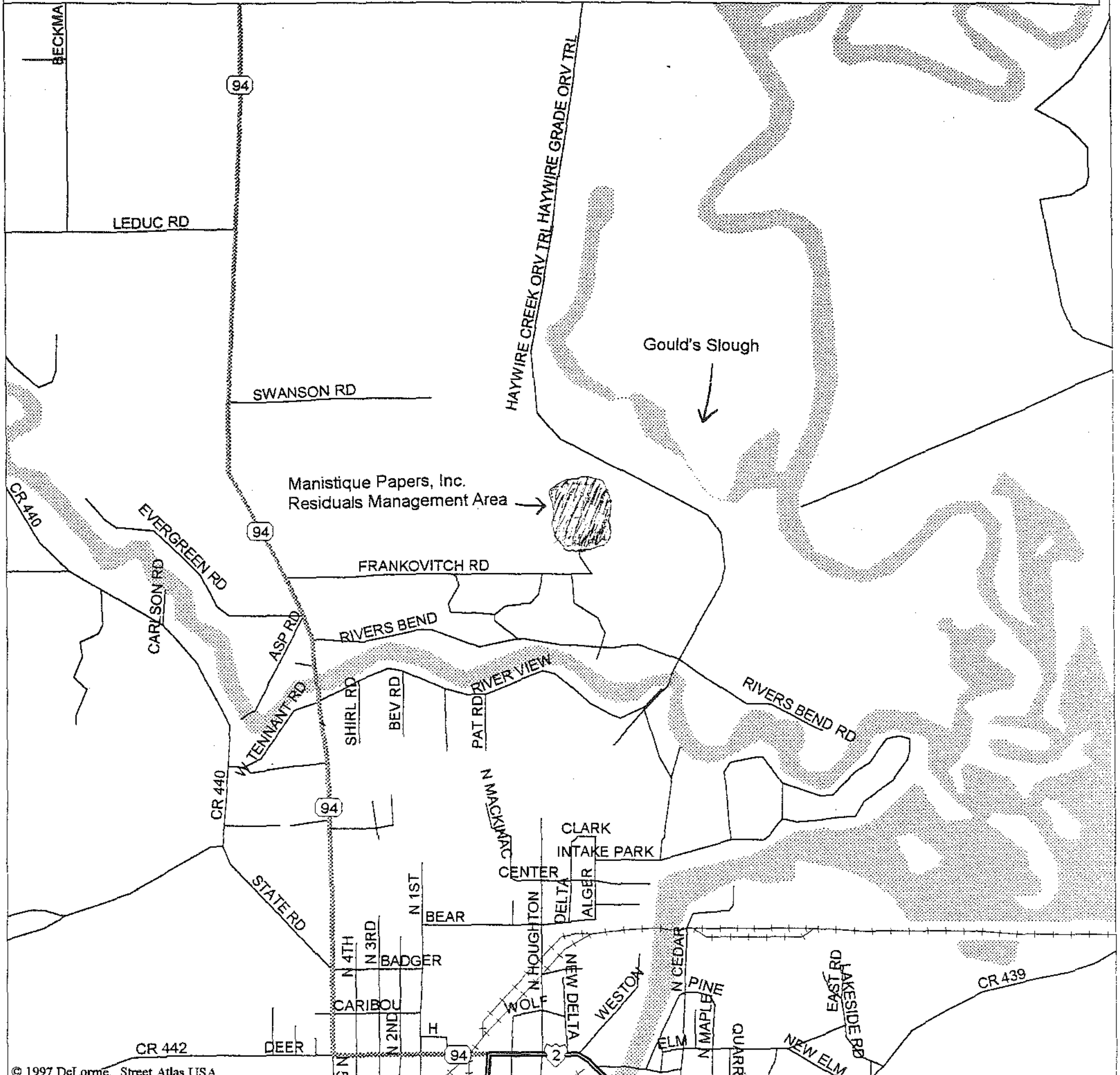


© 1997 DeLorme. Street Atlas USA

Mag 12.00
Thu Aug 13 08:16 1998
Scale 1:125,000 (at center)
2 Miles
2 KM

Local Road
Trail
US Highway
Major Connector
State Route
Railroad
County Seat
Airfield
Geographic Feature
Park/Reservation
Locale
Public Airport
Cemetery
Land

Figure 2: Manistique Papers, Inc. RMA Location



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Mag 14.00
Thu Aug 13 08:15 1998
Scale 1:25,000 (at center)

2000 Feet

500 Meters

Local Road
Trail
US Highway
State Route
Railroad
Land
Water
River/Canal

Photograph No.: 1-1 Time: 1145
Direction: West Date: June 9, 1998

Description: Drill rig stationed at location SLG-6. PID screening is being conducted on material in split spoon from sample interval SLG-6(4-6).

Photograph No.: 1-2
Direction: Southwest

Time: 0937
Date: June 10, 1998

Description: Drill rig on station at sample location SLG-7.

Photograph No.: 1-3
Direction: South

Time: 1035
Date: June 10, 1998

Description: Sludge material in split spoon from sample interval SLG-7(26-28).

Photograph No.: 1-4
Direction: South

Time: 1050
Date: June 10, 1998

Description: Homogenization of sludge sample SLG-7(32-34) in stainless steel bowl.

Photograph No.: 1-5
Direction: Southeast

Time: 1117
Date: June 10, 1998

Description: Transferring sludge sample SLG-7(38-40) from stainless steel bowl to the Bittner Engineering sample collection container.

Photograph No.: 1-6
Direction: South

Time: 1200
Date: June 10, 1998

Description: Transferring sludge sample SLG-7(48-50) from the split spoon to the stainless steel sample bowl.

Photograph No.: 1-7
Direction: North

Time: 1530
Date: June 10, 1998

Description: Drill rig on station at location SLG-8. PID screening of sludge sample SLG-8(29-31).

Photograph No.: 1-8 Time: 1700
Direction: North Date: June 10, 1998

Description: Photograph of the soil/sludge contact at the base of boring SLG-8.

No photograph available.

Photograph No.: 1-9
Direction: South

Time: 0830
Date: June 11, 1998

Description: Photograph of sludge sample SLG-9(6-8) did not develop.

Photograph No.: 1-10
Direction: Down

Time: 0915
Date: June 11, 1998

Description: Sludge sample SLG-9(24-26).

Photograph No.: 1-11
Direction: West

Time: 0942
Date: June 11, 1998

Description: Sludge sample SLG-9(32-34).

Photograph No.: 1-12
Direction: North

Time: 0955
Date: June 11, 1998

Description: Sludge sample SLG-9(36-38).

Photograph No.: 1-13
Direction: Down

Time: 1130
Date: June 11, 1998

Description: Collection of surface water in a beaker from surface water and sediment sampling location SW/SED-3.

Photograph No.: 1-14
Direction: South

Time: 1410
Date: June 11, 1998

Description: Photograph of surface water and sediment sampling location SW/SED-4 at base of small orange flag immediately to the right of the sampling bowl.

Photograph No.: 1-15
Direction: North

Time: 0900
Date: June 12, 1998

Description: IDW temporary storage area as it appeared prior to TechLaw leaving the site on June 12, 1998.

Photograph No.: 1-16
Direction: Southeast

Time: 0902
Date: June 12, 1998

Description: IDW temporary storage area as it appeared prior to TechLaw leaving the site on June 12, 1998.

APPENDIX C

FIELD NOTES

INCH CM

MEASUREMENT CONVERSIONS

IF YOU KNOW	MULTIPLY BY	TO FIND
LENGTH		
inches	2.540	centimeters
feet	30.480	centimeters
yards	0.914	meters
miles	1.609	kilometers
millimeters	0.039	inches
centimeters	0.393	inches
meters	3.280	feet
meters	1.093	yards
kilometers	0.621	miles
WEIGHT		
ounces	28.350	grams
pounds	0.453	kilograms
grams	0.035	ounces
kilograms	2.204	pounds
VOLUME		
fluid ounces	29.573	milliliters
pints	0.473	liters
quarts	0.946	liters
gallons (U.S.)	3.785	liters
milliliters	0.033	fluid ounces
liters	1.056	quarts
liters	0.264	gallons (U.S.)

TEMPERATURE

°C = (°F - 32) x .555
°F = (°C x 1.8) + 32

Inches	Decimals of foot	Milli-meters
1/16	.0052	1.5875
1/8	.0104	3.1750
3/16	.0156	4.7625
1/4	.0208	6.3500
5/16	.0260	7.9350
3/8	.0313	9.5250
1/2	.0417	12.700
5/8	.0521	15.875
3/4	.0625	19.050
7/8	.0729	22.225
1"	.0833	25.400
2"	.1667	50.800
3"	.2500	76.200
4"	.3333	101.60
5"	.4167	127.00
6"	.5000	152.40
7"	.5833	177.80
8"	.6667	203.20
9"	.7500	228.60
10"	.8333	254.00
11"	.9167	279.40
1 foot	1.0000	304.80

"Rite in the Rain"®
ALL-WEATHER WRITING PAPER

Name Anthony Meliso

Address 20 N Wacker Drive #1260
Chicago, IL 60606

Phone 312-345-8977

Project Field Sampling & Analysis Plan, Menominee Papers Facility & Residuals Mgmt Area

"Rite in the Rain" - a unique all-weather writing surface created to shed water and to enhance the written image. Makes it possible to write sharp, legible field data in any kind of weather.

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CONTENTS

PAGE	REFERENCE	DATE

0845. Arrive at facility with:
Ms. Diane Sharrow, USEPA
Mr. Todd Quillen, Techlaw
Ms. Karen Higgins
Anthony Mulberro
Mr. Clayton Ebsch, Bittner Engineering
Mr. Dennis E. Bittner, Bittner Eng.
Mr. Jim Cook, ~~Bittner Eng.~~ Manistique Papers AM, 06/09/98

Mr. Dennis Bittner & Ms. Diane Sharrow lead the introductory mtg.

0905: Arrive at the paper mill press area to collect some waste paper samples

0920: Collected three (3) containers of paper mill press samples
1 8oz jar to be analysed for TCLP Metals
1 8oz jar to be analysed for TCLP VOCs, SVOCs, Metals
1 4oz jar to be analysed for PCBs
→ Sample No. is PRS-1
AM — 06/09/98

0935: Leave the paper mill & head for the RMA area.

- Temperature was 54°F
- It was sunny

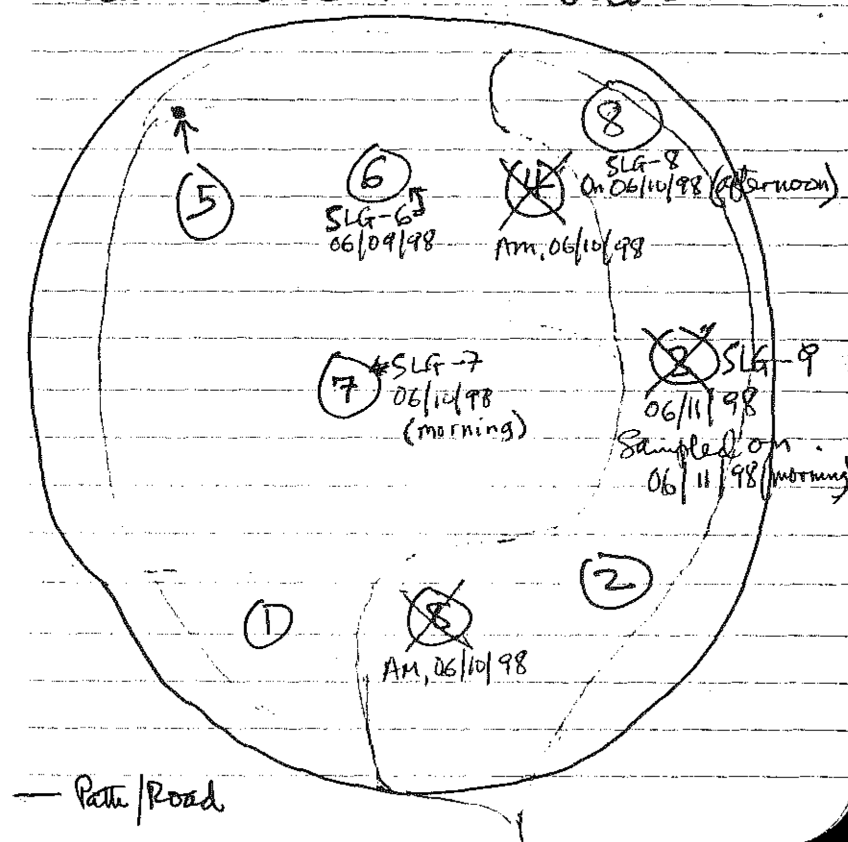
Note ▷ Sample PRS-1 was collected using nitrile gloves, a steel spoon & steel container.

- Samplers were wearing steel toed boots, hard hats, & safety glasses.

0945: Got to the residuals mgmt area (RMA).

1100: Coleman Engineering Company (Iron Mountain, MI, 906/774-3440) sets up its equipment to drill for the 1st waste pile samples. Colemans drilling team consisted of Messrs:
(i) Dave Adams
(ii) Mark Teeter

* The tentative waste pile sampling locations are shown below:



Coordinates for Waste Pile Sampling locations (As determined by GPS Pioneer Magellan gadget)

Boring location #	latitude	Longitude
6 (SLG-6)	45° 59.21 N	086° 15.16 W
SLG-7	45° 59.17 N	086° 15.13 W
SLG-9	45° 59.12 N	086° 15.08 W
SW-4/sed-4	45° 59.19 N	086° 15.23 W

1202: Broke for lunch

1320: Back to the RMA after lunch. Continue at boring location #6 (SLG-6).

1700: Complete sampling at SLG-6.

1715: Begin decontamination of equipment used for sampling at SLG-6

1810: leave site for the day

AM, 06/09/98

 W, 06/10/98

0845: Arrive at RMA
0850: Set up work station at location of 2nd waste pile boring @ SLG-7

See corresponding field sheets for notes taken while sampling at location SLG-7.

1245-1250: Completed sampling at location SLG-7.

1255: Joined (Kevin Higgins & Mark) other TechLaw Sampling team ~~that~~ to assist them with sampling of groundwater monitoring wells.
Am, 06/10/98

1320: Left site for lunch
1406: Returned to site after lunch
* TQ places flag over next sampling location, SLG-8
* Prepare sample labels & tags, as drilling crew is decontaminating its equipment,
* Stationed right near where drilling crew is running it's decon. operations. AM —— 06/10/98

1500: Drillers begin working on location SLG-8.

1715: Completed sampling at location SLG-8 & proceeded to decontamination area to decontaminate equipment used at this location.

1813: Completed decontaminating activities.

1815: Drillers begin decontaminating their equipment.

~1900: Leave site for the day. Head for the hotel

1915 – 2020: Continue with Labelling & Tagging related paperwork at the hotel.

Am, 6/10/98

TH, 06/11/98

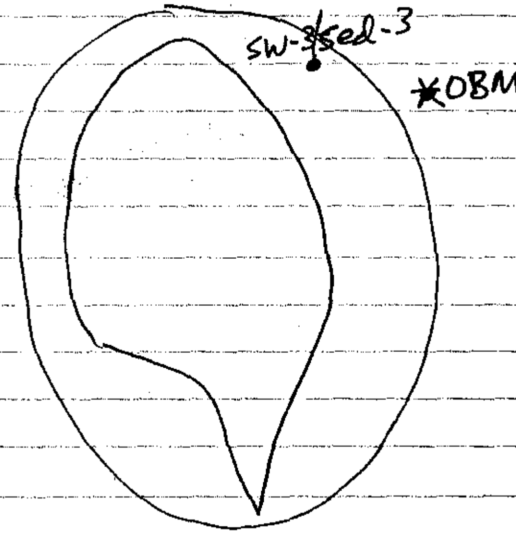
0820: Arrive at site (RMA)
Set up work station at waste pile sampling location, SLG-9

1040: Completed collecting samples at location SLG-9. Proceeded to decontamination area to get set for collecting an equipment blank sample of the materials used at SLG-9

1130: Collected surface water/Sediment sample at AM, 6/11/98 from location SW-3/SED-3.
Measured the following parameters
Temp of the surface Water = 60°F
pH = 7.25
Conductivity = 810 μohms

Photograph 12
Taken at 1130
Direction = down of SW-8/Sed-3
AM
06/11/98

location of SW-3/Sed-3 was approx 50 yards away from OBM



1215: Completed collecting samples from SW-3/Sed-3.

1217: Went back to RMA waste pile area to check with the drilling crew.
AM
06/11/98

1320: Started collecting surface water & sediment samples at location SW-4 / Sed-4.

Began by collecting a beaker of the water that was going to be sampled & measuring / getting readings on the following parameters:

Temp. of the surface water = 70°F

pH = 6.91

Cond = 1090 μ Ohms cm^{-1}

Photo 13 ⇒ Photo showing flag placed at location from which the samples were taken.

Collected ⇒ 3 VOC vials ⇒ SW-4

3 VOC vials ⇒ Dup 11

4 (4oz.) Sed. jars + 2 1 litre plastic bottles (metals..)

1410: Completed collecting surface water & sediment samples at SW-4 / Sed-4.

1500: Return to hotel to prepare sample labels & tags & to pack a sample cooler for shipment.

AM 06/11/98

1650: FedEx accepts custody of the sample cooler.

1655: Arrive at RMA to label the IDW ~~cooler~~ drums. Found gate leading into waste pile area closed.

AM. 06/11/98

1745: Complete labelling containers of IDW waste & setting up the containment area for these drums.

1747: Leave the site for the day.

AM 06/11/98

INCH CM

MEASUREMENT CONVERSIONS

IF YOU KNOW	MULTIPLY BY	TO FIND
LENGTH		
inches	2.540	centimeters
feet	30.480	centimeters
yards	0.914	meters
miles	1.609	kilometers
millimeters	0.039	inches
centimeters	0.393	inches
meters	3.280	feet
meters	1.093	yards
kilometers	0.621	miles
WEIGHT		
ounces	28.350	grams
pounds	0.453	kilograms
grams	0.035	ounces
kilograms	2.204	pounds
VOLUME		
fluid ounces	29.573	milliliters
pints	0.473	liters
quarts	0.946	liters
gallons (U.S.)	3.785	liters
milliliters	0.033	fluid ounces
liters	1.056	quarts
liters	0.264	gallons (U.S.)

TEMPERATURE

°C = (°F - 32) x .555
°F = (°C x 1.8) + 32

Inches	Decimals of foot	Millimeters
1/16	.0052	1.5875
1/8	.0104	3.1750
3/16	.0156	4.7625
1/4	.0208	6.3500
5/16	.0260	7.9350
3/8	.0313	9.5250
1/2	.0417	12.700
5/8	.0521	15.875
3/4	.0625	19.050
7/8	.0729	22.225
1"	.0833	25.400
2"	.1667	50.800
3"	.2500	76.200
4"	.3333	101.60
5"	.4167	127.00
6"	.5000	152.40
7"	.5833	177.80
8"	.6667	203.20
9"	.7500	228.60
10"	.8333	254.00
11"	.9167	279.40
1 foot	1.0000	304.80

"Rite in the Rain"®
ALL-WEATHER WRITING PAPER

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TechLaw
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Phone (312) 345-8915

Project Manistique Papers, Inc.
Residuals Management Area

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6/9/98

0830 Met Jim, Clayton, and Dennis Bittner at Mill for kickoff meeting

0-2 not collected Grass
2-4 0.6-4.0 pid Sludge w/ 4 < 1 inch black Sandy layers
4-6

1347 First Sample Collected

20-21 NR / 21-22 wet Sludge
22-24 0.0-1.6 22-22.5 NR 8" Ash then Sludge
24-24.5 NR 24.5-25 Ash 25-25.5 Sludge
25.5-26 Ash 0.0-0.6 PID Gravelly Ash
2

Collected 3rd sludge sample @ 50-52

6/10/98

0830 Arrived on site
organized coolers
Located SLG-7
Re calibrated PID w/ 0 Gas and
100 ppm isobutylene
Filling in for Anthony who is keeping log data
0-2 discarded, topsoil, Grass
2-4 Sludge Grey 0.5 - 20.8 PID
4-6 Sludge Grey 0.7-8.2 PID
6-8 Sludge Grey 0.4-4.8 PID
7.5-8.0 Ash black
8-10 Sludge Grey 0.2-4.5 PID
8-8.5 No Recovery
~~12~~ 12-14 Sludge Grey 0.2-0.5 PID
~~12~~ 12-13 No Recovery
14-16 Sludge Grey 0.0 PID
14-15 No Recovery
The remaining log is on data sheets
The toxiray did not start-up/dead-battery
Kevin and Mark are using our PID to clear
The wells. Slows down progress
Completed borings SLG-7 and SLG-8
Samples from SLG-6 and SLG-7 sent
off today. Sunny, 60°F +/-, 5-10kt wind.
Level D PPE, steel toe, Glasses, Gloves,

 6/10/98

Long sleeve jeans, shirt
Kevin and Mark still collecting surface
water/seds.
Left site at ~~060~~ 1800
tagged and labeled all samples
collected today. Kevin and Mark
managed to get both well OB-10
and W-4R sent off today too.
prepped bottleware for blanks,
2 surface waters, and 2 remaining
wells. Finished at 2045.

6/11/98

Notes kept on data sheets.
Todd and Anthony sampled SLG-9 and SW/SED-3 and SW/SED 4
IDW drummed up and placed onto plastic. All drums Labbled. Mark Finished wetlands @ 1930. We had all Samples loaded and The vans packed by 2330.
The Fedex Shipment That went out at 1640 had all of The remaining VOCs and Encores, and Nitrate/Nitrites.

6/12/98
TQ went to paper Mill and Showed up at 0750 to have check-out meeting w/ Jim COOK (ext. 229).
Discussed That we were Finished at The site and The IDW is The only evidence of our investigation remaining at The RMA. Jason Panek, a Technical specialist, was present for The meeting.
I went back to The
photos taken N. 0900 and SE 0901

SLG-6, SLG-7, SLG-8

Sample No./ Boring Depth	Date/Time	Photo No./ Direction	Parameters to be Analyzed	Remarks
* Paper Mill Press PRS-1	06/09/98 0920	None taken	TCLP VOCs & SVOCs & Metals 8oz. jar	Sample was grey & had a wet papery appearance. Sample was collected into a steel bowl. It was homogenized before being collected into sample containers.
* Paper Mill Press PRS-1	06/09/98 0920	None taken	TCLP Metals 8oz jar	
* PRS-1	06/09/98 0920	None Taken	PCBs 4 Oz jar	
SLG-6 (~~4-6~~) SLG-6(6-8)	06/09/98	Roll 1, Photo 1 West		P.I.D = 0.6 - 4.0 Sample appeared "greyey" plus dark soily material. Sample not collected at this interval.
SLG-6(8-10)	06/09/98 1150	Photo 1 West		PID = 0.3 - 09
SLG-6(10-12)	1152	West		PID = 0.5 - 3.2
				No sample collected at 8-10 interval. Sample was all sludge except for about 2" of boiler ash at bottom.
SLG-6(11-12)	1157	West		PID = 1.00 - 4.2 Papery grey sludge except for bottom 1.5" which was darker boiler ash. No sample was collected.

Sample No./ Boring Depth	Date/Time	Photo No./ Direction	Parameters to be Analyzed	Remarks
SLG~~7~~(13-14) No recovery at SLG(12-13)	06/09/98 1202	Photo 1		PID reading 0.5-3.5 Boiler ash appearance No sample collected
SLG-6(15-16)	1325	Photo 1		PID = 16. 1/2 was grey coloured papery sludge 1/2 was dark boiler ash No sample taken
* SLG-6(16-18)	1334	Photo 1	VOCs → 3 Encore samplers	PID ⇒ up to 6.7 Sludge, grey
Also collected ⇒ 1 500ml (12oz) jar; 1 120ml (4oz) jar; 1 25ml bottle - for moisture determination				
SLG-6(18-20)	1345	Photo 1		PID ⇒ 0.5 to 3.8 No sample collected It was all grey sludge
SLG-6(21-22)	1350	Photo 1		PID ⇒ 0 to 0.8 Watery sludge, Grey color.
SLG-6(22-24) No samples taken				PID ⇒ 0 to 1.6 1.5ft at bottom had 8" of dark ash & the rest was papery sludge

Sample No./ Boring Depth	Date/Time	Photo No./ Direction	Parameters to be Analyzed	Remarks
SLG-6(26-28)	06/09/98 1406	Photo 1		PID ⇒ 0 to 0.2 Mostly boiler ash. Bottom ½ foot was grey papery sludge No sample collected.
SLG-6(28-30)	1410	Photo 1		PID ⇒ 0.2 to 3.4 Top 1.5 ft was sludge, grey Bottom ½ ft. was mixture of dark boiler ash & grey papery sludge No Sample taken.
SLG-6(30-32) No sample taken	1415	Photo 1		PID ⇒ 0.2 to 1.6 Top 1.5 ft ⇒ Sludge, Grey, Papery, Very wet Bottom 0.5 ft ⇒ Dark boiler ash, wet
SLG-6(32-34)	1420	Photo 1		PID ⇒ 0 to 0.5 Top 1 ft ⇒ grey water w/ rainbow sheen Bottom ft ⇒ Sludge, grey, wet No samples taken.
SLG-6(34-36)	1427	Photo 1		PID ⇒ 0.3 to 0.8. All grey papery sludge. Top 0.8 ft was very moist. No sample(s) collected
SLG-6(36-38)	1435	Photo 1		PID ⇒ 0.5 to 3.2 Top 1.5 ft ⇒ All papery sluge, wet, grey. Bottom ½ ft ⇒ sludge mixed with corse boiler a[illegible] No Samples collected.
* SLG-6(38-40)	1440	Photo 1	PCB	PID ⇒ 0 to 4.3 Top 0.5 ft ⇒ grey water Bottom 1.5 ft ⇒ sludge, grey Collected 4 Oz. jar (120 ml)
SLG-6(40-42)	1450	Photo 1		PID ⇒ 0 to 4.8 Papery sludge, grey, very wet. No Sample(s) taken.
SLG-6(42-44)	1503	Photo 1		PID ⇒ 0.2 to 4.3 All wet, very dark boiler ash. Except bottom 8 inches were grey papery sludge. No Samples collected
SLG-6(44-46)	1506	Photo 1		PID ⇒ 0 to 1.3 Bottom 1 ft ⇒ sludge, grey, very wet Top 1 ft ⇒ Boiler ash, dark, very wet. No Samples collected
SLG-6(46-48) No samples collected	1520	Photo 1		PID ⇒ 0.2 to 2.1 Top 1.5 ft ⇒ dark water w/ slight sheen Bottom 0.5 ft ⇒ Boiler ash, Dark.
** SLG-6(48-50)	1530	Photo 1	3 VOC vials	PID ⇒ 0 to 1.2 Top half ⇒ water mixed with boiler ash. Bottom ½ very wet papery sludge. Grey. Collected samples Sample contained chain link wires/parts of

other samples ⇒ 1 25 ml bottle (Moisture det)
⇒ 1 500 ml (12 Oz.) jar

Sample No./ Boring Depth	Date/Time	Photo No./ Direction	Parameters to be Analyzed	Remarks
SLG-6(50-52)	06/09/98 1545	Photo 1	No Samples Collected	PID ⇒ 0 to 0.4 Top 1 ft ⇒ saturated boiler ash. Bottom ft ⇒ Boiler ash, very dark
SLG-6(52-54)	06/09/98 1553	Photo 1	No samples Collected.	PID ⇒ 0.2 to 1.8 Top foot ⇒ Boiler ash, dark, wet Bottom foot ⇒ Grey Sludge
SLG-6(54-56)	06/09/98 1604	Photo 1	No Samples Collected	PID ⇒ 0.2 to 10.9 Papery sludge, grey, w/ some native organic matter
SLG-6(56-58)	06/09/98 1620	Photo 1	No Sample Collected	PID ⇒ 0 to 0.6 Top 1.5 ft ⇒ was Grey papery sludge Bottom ½ ft was dark, loamy, Soil
SOIL COLLECTED PORTION OF THIS INTERVAL				
Soil-~~SLG~~(57.5-59) Am, 06/09/98 Hit Bed rock	06-09-98 1635	Photo 1	1 500 ml (12 OZ.) Jar Collected for SVOCs, PCBs & Metals analysis.	PID reading not taken. Soil ⇒ Dark, loamy, Soil. Had pieces of chain link fence.

Added to this interval

Sample No./ Boring Depth	Date/Time	Photo No./ Direction	Parameters to be Analyzed	Remarks
SLG-7 (~~10-12~~) 11.5-12 AM, 06/10/98	06/10/98 0937	Photo 2 S.W	No sample Collected	Papery sludge, wet, grey. No PID readings taken. No. See TQ's notebook. PID taken.
SLG-7 (16-17.5)	06/10/98 0956	Photo 2	No samples taken	PID ⇒ 0.5 to 1.2ppm Papery sludge, grey
SLG-7 (19-20)	06/10/98 0958	Photo 2	No Sample Collected	PID ⇒ 0 ppm Papery sludge, grey. mixed with some decaying woody material that was darker.
SLG-7 (21-22)	06/10/98 1005	Photo 2	No Sample Collected	PID ⇒ 0.5 - 2.2 Dark woody material
SLG-7 (23-24)	06/10/98 1010	Photo 2	No Sample taken	PID ⇒ 0.5 - 1.7 Papery slugde, grey mixed w/. darker woody material
SLG-7 (24-25.5) Drillers Switched to using an 18" (approx) Spoon - but still driving	06/10/98 1025	Photo 2	No Sample taken	PID ⇒ 0 Very wet material. Papery sludge (grey) mixed with woody (darker) material

Through a 2 foot interval. Basically means that they are packing 2ft of material into an 18" spoon.

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	Sample No./ Boring Depth	Date/Time	Photo No./ Direction	Parameters to be Analyzed	Remarks
	SLG-7 (26-28)	06/10/98 1035	Photo 3 South showing appearance of retrieved material at this interval	No Samples Collected	0.2 to 1.5 ppm on PID Grey papery sludge mixed w/. darker, woody material
	SLG-7 (28-30)	06/10/98 1042	None taken	No Samples Collected	PID ⇒ 0 Grey papery sludge
	SLG-7 (30-32)	06/10/98 1047	None	None	PID ⇒ 0 Grey papery sludge
Sample taken	SLG-7 (32-34)	06/10/98 1050	Photo 4 South Sample being homogenized.	*3 VOC Encore Vials *1 500 ml jar TCLP metals, App IX, SVOCs *1 120 ml jar for PCBs	PID ⇒ 0.5 to 12.3 ppm Grey papery sludge
	SLG-7 (36-37.5)	06/10/98 1110	None	None	PID ⇒ 0.3 to 11.3 ppm Grey papery sludge
PCB Sample taken	SLG-7 (38-40)	06/10/98 1117	Photo 5 Sample being homogenized *S. East direction	* 1 120 ml jar for PCB analysis	PID ⇒ up to 10.8 ppm Bottom foot ⇒ Dark boiler ash Top foot or so ⇒ Grey papery sludge mixed with woody material

Sample No./ Boring Depth	Date/Time	Photo No./ Direction	Parameters to be Analyzed	Remarks
SLG-7 ~~(42-44)~~ (40-42) Am, 06/10/98	06/10/98 1123	None	None	PID ⇒ 0.5 - 7.5ppm Grey papery sludge mixed with woody material
SLG-7 ~~(44-46)~~ (42-44) Am, 06/10/98	06/10/98 1135	None	None	PID ⇒ 0.2 - 3.5ppm Grey papery sludge
SLG-7 ~~(46-48)~~ (44-46) Am, 06/10/98	06/10/98 1138	None	None	PID ⇒ 0.4 - 4.5ppm Grey sludge mixed with darker woody material
SLG-7 ~~(48-50)~~ (44-48) Am, 06/10/98	06/10/98 1150	None	None	PID ⇒ 0.4 - 9.8ppm grey sludge mixed with darker woody material. * Half a foot of the darker woody material is at the bottom of the sampling spo
* samples taken SLG-7 ~~(50-52)~~ (48-50) Am, 06/10/98	06/10/98 1200	Photo 6 South Sample being put into steel jar for homogenization	* 1500ml (12 oz) jar for TCL & metals & App. IX metals * 1120ml (4 oz) jar for PCBs	PID ⇒ 0.2 - 4.8 ppm Top 1ft ⇒ grey sludge Bottom ≈ 0.5 ft ⇒ darker woody material
SLG-7 ~~(52-53.5)~~ (50 - 51.5) Am, 06/10/98	06/10/98 1207	None	None	PID ⇒ 0 * Most of the recovery was grey sludge water + a little sludge & approx ½ foot of fine to medium grain sandy soil. Note: Bottom ½ ft (~~53.5-54~~) (50.5-51.5) Am, 06/10/98 was collected & added to proceeding int[erva]l's recovery

Sample No./ Boring Depth	Date/Time	Photo No./ Direction	Parameters to be Analyzed	Remarks
*? SLG-7 (~~54-56~~) (51.5-53) Am, 06/10/98	1213 06/10/98	None, but took video recording		See video VOCs, SVOCs, App. IX metals
SLG-8 0-25 feet	Approx Lat Lon	45° 59.20 N 086° 15.08 W		No split spoons collected All cuttings That came up The hole appeared to be sludge, Grey
SLG-8 25-27	1520 6/10/98	none	none	PID 0.2 - 6.5 Sludge, Grey some dark staining at 25.5 (4")
SLG-8 27-29	1527 6/10/98	none	none	PID 0.2 - 1.4 Sludge, Grey 2" layer of ash at 28.5
SLG-8 29-31	1530 6/10/98	Photo 7 North	none	PID 0.0 to 0.8 Sludge, Grey From 30-31 29-30 No Recovery
* SLG-8 31-33	1536 6/10/98	none	TCLP Metals metals PCB	PID 0.0 Ash, black, med to coarse Grain, no pebbles
SLG-8 33-35	1540 6/10/98	none	none	PID 0.0 Ash, black From 33-34.5 Sludge grey From 34.5-35

Sample No./ Boring Depth	Date/Time	Photo No./ Direction	Parameters to be Analyzed	Remarks
SLG-8 35-37	1543 6/10/98	none	none	PID 0.0 Ash black wet From 36-37. No Recovery From 35-36
SLG-8 37-39	1549 6/10/98	none	none	PID 0.2 to 1.3 Ash, black, Coarse w/pebbles. Laminated Ash and Sludge (0.5 cm scale) at bottom
SLG-8 39-41	1555 6/10/98	none	none	PID 0.0 Ash black med to coarse Grained From 39-39.5 Sludge, Grey from 39.5-40 Sludge, wet/soupy, Grey 40-41
SLG-8 41-43	1602 6/10/98	none	none	PID 0.0 ASH, Grey to black mixed w some Sludge, med to coarse grained. 41-42 No Recovery
SLG-8 43-45	1605 6/10/98	none	none	PID 0.1-0.8 Ash, Grey to black From ~~43~~-44 wet, coarse to med Grained Sludge, Grey, Firm, 44-45
SLG-8 45-47	1612 6/10/98	none	none	PID 0.1-2.0 Ash, Grey, med to coarse grained From 45-45.5 Sludge, Grey Firm below
* SLG-8 47-49	1622 6/10/98	none	PCB & ~~Dup 2~~ ~~for PCB~~	PID 0.0-1.0 Sludge Grey Firm From 47-48.5 Laminated (0.5 cm scale) black and Grey Sludge & Ash from 48.5-49
SLG-8 49-51	1626 6/10/98	none	none	PID 0.0 ~~-6~~ Sludge Grey From 49-50 Sludge, tan From 50-51

Sample No./ Boring Depth	Date/Time	Photo No./ Direction	Parameters to be Analyzed	Remarks
* SLG-8 51-53	1630 6/10/98	none	TCLP Metals App IX Metals + T. PCB Dup 21 for Metals & PCB	PID 0.0 Sludge, Grey and tan
SLG-8 53-55	1640 6/10/98	none	none	PID 0.3-12.8 Sludge, Grey to tan
SLG-8 55-57	1645 6/10/98	none	none	PID 0.3-2.2 Sludge, Grey to tan from ~~54-55~~ to 56-57 ~~53-54~~ to 55-56 No Recovery
* SLG-8 ~~59-61~~ to 57-58	1700 6/10/98	Photo 8	Metals PCB ☆	PID 0.1-5.5 Sludge Grey From 57-57.5 Sand Light brown, Fine to med 57.5-58

☆ no VOC/SVOC could be collected from This soil interval because of The insufficient volume recovered Brown sand was in The bottom of The bit in The 55-57 interval. Because only 6 inches of soil was recovered in The 57-59 foot interval it seems that 1 to 1.5 feet of soil/sand must have slipped out of The splitspoon during retrieval (not unusual). The decision was made by TQ not to go down another interval for VOC/SVOC because The soil/sand That fell out would have been disturbed

Sample No./ Boring Depth	Date/Time	Photo No./ Direction Photo 9 is next	Parameters to be Analyzed	Remarks
SLG-9(2-4)	06/11/98 0820	None	None	Grey sludge PID = 0.2 – 12.8 ppm
SLG-9(~~4~~-6)	06/11/98 0825	None	None	Some grey sludge mixed with boiler ash. One foot of recovery from 5' to 6'. PID = 0.2 to 1.6 ppm
SLG-9(6-8)	6/11/98 0830	Photo 9 South * Showing split spoon w/ material from this	None recovered interval.	PID = 0.2 to 7.7 ppm Some grey sludge mixed with darker boiler ash. Only 1 ft of recovery (7'-8').
SLG-9(8-10)	6/11/98 0832	None	None	PID = 0.5 – 3.0 ppm Grey sludge mixed with boiler ash. Had only ½ ft of recovery at bottom (9.5'–10') of spoon.

Sample No./ Boring Depth	Date/Time	Photo No./ Direction	Parameters to be Analyzed	Remarks
SLG-9(10-12)	06/11/98 0837	None	No Samples Collected	PID = 0 Only recovered 6 inches (11.5' – 12') of grey sludge.
SLG-9(12-14)	6/11/98 0842	None	None	PID = 0 Only recovered ≈ ½ a foot of mostly woody material (decaying) mixed with some grey sludge.
SLG-9(14-16)	6/11/98 0845	None	None	PID = 0 material has appearance as that collected at SLG-9(12-14) Recovery was in interval from 13.5' – 14'
SLG-9(16-18)	6/11/98 0850	None	None	PID = 0 mostly grey liquid with tidbits of sludge

Sample No./ Boring Depth	Date/Time	Photo No./ Direction	Parameters to be Analyzed	Remarks
SLG-9(18-20)	6/11/98 0900	None	None	PID = 0.5 – 4.7 ppm Grey water. Bottom 1/2 foot (19.5' – 20) had some very watery sludge.
SLG-9(20-22)	6/11/98 0903	None	No samples Collected	PID = 0.5 – 9.7 ppm Top 1/2 foot (20' – 20.5') was grey water. The rest was grey sludge
SLG-9(22-24)	6/11/98 0906	None	None	PID = 1.0 – 11.6 ppm Same as at SLG-9(20-22)
* SLG-9(24-26)	6/11/98 0915	Photo 10	3 Encore vials 1 (25ml) bottle for moisture 1300 ml jar	PID = 1.0 – 23.9 ppm wet Grey sludge, with about 1/2 foot of grey water on top. Samples were collected
SLG-9(26-28)	6/11/98 0925	None	None	No recovery ∴ No PID

Sample No./ Boring Depth	Date/Time	Photo No./ Direction	Parameters to be Analyzed	Remarks
SLG-9(28-30)	6/11/98 0930	None	None	PID = 3 - 5.5 Recovered spoonful of grey sludge. Note: PID instrument has been "acting up" since last interval. Min. background ≃ 2.5 ppm.
SLG-9(30-32)	6/11/98 0937	None	None	PID = 3 - 13.7 ppm Recovered spoonful of grey sludge. Wet.
* SLG-9(32-34)	6/11/98 0942	Photo 11 West. * Showing spoon from which PCB sample was drawn	1 (120 ml) jar for PCB analysis	PID = 3.0 - 7.7 ppm Grey sludge, wet.
* SLG-9(34-36)	6/11/98 0950	None	4 Encore Vials * MS/MSDs	PID = 3 - 21.2 ppm Bottom 1/2 ft ⇒ wood Rest ⇒ Grey papery Sludge

Sample No./ Boring Depth	Date/Time	Photo No./ Direction	Parameters to be Analyzed	Remarks
SLG-9(36-38)	6/11/98 0955	None	See remarks	Discarded →  grey paper sludge; wood; 5" fine sand; This portion was collected and the sandy part was.
TM, 06/11/98 ~~SLG-9(38-40)~~ * Soil-9(38-40)	6/11/98 1020	None Collected: *3 Encore vials *1 (120ml) bottle for % moisture *2 (4oz.) jars		Discarded → → Consolidated with the sand collected in the interval Soil-9(38-40)  1 foot of grey sludge; wood; 1/2 foot of fine sandy soil.

APPENDIX D

ANALYTICAL RESULTS

VOLATILE ORGANIC COMPOUNDS - DATA VALIDATION SUMMARY TABLES

Sample Number	SOIL-9 (38-40)		SLG-9 (24-26)		SLG-9 (34-36)		EB-1		EB-2		EB-3		OB-14	
Lab Sample Number	A8F140101-012		A8F140101-013		A8F140101-014		A8F140101-015		A8F140101-016		A8F140101-017		A8F140101-018	
Matix	Solid		Solid		Solid		Water		Water		Water		Water	
Analyte	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Units	ug/Kg		ug/Kg		ug/Kg		ug/L		ug/L		ug/L		ug/L	
Acetone	18	UJ	2900	U	2600	U	10	UJ	10	UJ	10	UJ	5.8	J
Acetonitrile			14000	UJ	13000	UJ	20	UJ	20	UJ	20	UJ	20	UJ
Acrolein							20	UJ	20	UJ	20	UJ	20	UJ
Acrylonitrile	92	U	14000	UJ	13000	UJ	20	U	20	UJ	20	U	20	UJ
Allyl chloride							2.0	U	2.0	UJ	2.0	U	2.0	UJ
Benzene	4.6	U	720	U	660	U	1.0	U	1.0	UJ	1.0	U	0.38	J
Bromodichloromethane	4.6	U	720	U	660	U	1.0	U	1.0	UJ	1.0	U	1.0	UJ
Bromoform	4.6	U	720	U	660	U	1.0	U	1.0	UJ	1.0	U	1.0	UJ
Bromobenzene														
Bromomethane	9.2	UJ	1400	U	660	U	2.0	U	2.0	UJ	2.0	U	2.0	UJ
2-Butanone	18	UJ	2900	U	2600	U	10	U	10	UJ	10	U	10	UJ
n-Butylbenzene			730		200	J								
sec-Butylbenzene			720	U	660	U								
tert-Butylbenzene			720	U	660	U								
Carbon disulfide	4.6	U	720	U	660	U	0.42	J	1.0	UJ	1.0	U	1.0	UJ
Carbon tetrachloride	4.6	U	720	U	660	U	1.0	U	1.0	UJ	1.0	U	1.0	UJ
Chlorobenzene	4.6	U	720	U	660	U	1.0	U	1.0	UJ	1.0	U	1.0	UJ
Clorodibromomethane	4.6	U	720	U	660	U								
Chloroethane	9.2	U	1400	U	1300	U	2.0	U	2.0	UJ	2.0	U	2.0	UJ
Chloroform	4.6	U	720	U	660	U	17		15	J	14		1.0	UJ
Chloromethane	9.2	U	1400	U	1300	U	2.0	U	2.0	UJ	2.0	U	2.0	UJ
Chloroprene							1.0	U	1.0	UJ	1.0	U	1.0	UJ
2-Chlorotoluene			720	U	660	U								

VOLATILE ORGANIC COMPOUNDS - DATA VALIDATION SUMMARY TABLES

Sample Number	SOIL-9 (38-40)		SLG-9 (24-26)		SLG-9 (34-36)		EB-1		EB-2		EB-3		OB-14	
Lab Sample Number	A8F140101-012		A8F140101-013		A8F140101-014		A8F140101-015		A8F140101-016		A8F140101-017		A8F140101-018	
Matix	Solid		Solid		Solid		Water		Water		Water		Water	
Analyte	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Units	ug/Kg		ug/Kg		ug/Kg		ug/L		ug/L		ug/L		ug/L	
4-Chlorotoluene			720	U	660	U								
Dibromochloromethane							1.0	U	1.0	UJ	1.0	U	1.0	UJ
1,2-Dibromo-3-chloropropane							2.0	U	2.0	UJ	2.0	U	2.0	UJ
1,2-Dibromoethane	4.6	U	720	U	660	U	1.0	U	1.0	UJ	1.0	U	1.0	UJ
Dibromomethane			720	U	660	U	1.0	U	1.0	UJ	1.0	U	1.0	UJ
m-Dichlorobenzene	4.6	U	720	U	660	U								
p-Dichlorobenzene	4.6	U	720	U	660	U								
o-Dichlorobenzene	4.6	U	720	U	660	U								
Trans-1,4-dichloro-2-butene			720	U	660	U	1.0	U	1.0	UJ	1.0	U	1.0	UJ
Dichlorodifluoromethane	9.2	U	1400	U	1300	U	2.0	U	2.0	UJ	2.0	U	2.0	UJ
1,1-Dichloroethane	4.6	U	720	U	660	U	1.0	U	1.0	UJ	1.0	U	1.0	UJ
1,2-Dichloroethane	4.6	U	720	U	660	U	1.0	U	1.0	UJ	1.0	U	1.0	UJ
cis-1,2-Dichloroethene	2.3	U	360	U	330	U								
trans-1,2-Dichloroethene	2.3	U	360	U	330	U	0.50	U	0.50	UJ	0.50	U	0.50	UJ
1,1-Dichloroethene	4.6	U	720	U	660	U	1.0	U	1.0	UJ	1.0	U	1.0	UJ
Dichlorofluoromethane			1400	U	1300	U								
1,2-Dichloropropane	4.6	U	720	U	660	U	1.0	U	1.0	UJ	1.0	U	1.0	UJ
1,3-Dichloropropane			720	U	660	U								
2,2-Dichloropropane			720	U	660	U								
cis-1,3-Dichloropropene	4.6	U	720	U	660	U	1.0	U	1.0	UJ	1.0	U	1.0	UJ
trans-1,3-Dichloropropene	4.6	U	720	U	660	U	1.0	U	1.0	UJ	1.0	U	1.0	UJ
1,1-Dichloropropene			720	U	660	U								

VOLATILE ORGANIC COMPOUNDS - DATA VALIDATION SUMMARY TABLES

Sample Number	SOIL-9 (38-40)		SLG-9 (24-26)		SLG-9 (34-36)		EB-1		EB-2		EB-3		OB-14	
Lab Sample Number	A8F140101-012		A8F140101-013		A8F140101-014		A8F140101-015		A8F140101-016		A8F140101-017		A8F140101-018	
Matix	Solid		Solid		Solid		Water		Water		Water		Water	
Analyte	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Units	ug/Kg		ug/Kg		ug/Kg		ug/L		ug/L		ug/L		ug/L	
1,4-Dioxane	460	UJ	72000	UJ	66000	UJ	200	UJ	200	UJ	200	UJ	200	UJ
Ethylbenzene	4.6	U	300	J	910		1.0	U	1.0	UJ	1.0	U	1.0	UJ
Ethyl Methacrylate							1.0	U	1.0	UJ	1.0	U	1.0	UJ
Freon 113			720	U	660	U								
Hexachlorobutadiene			720	U	660	U								
2-Hexanone	18	U	2900	U	2600	U	10	U	10	UJ	10	U	10	UJ
Iodomethane			720	U	660	U	1.0	U	1.0	UJ	1.0	U	1.0	UJ
Isobutyl alcohol							50	UJ	50	UJ	50	UJ	50	UJ
Isopropylbenzene			720	U	660	U								
p-Isopropyltoluene			5100		22000									
Methacrylonitrile							1.0	U	1.0	UJ	1.0	U	1.0	UJ
Methylene chloride	4.6	U	720	U	660	U	2.1		1.5		1.4		0.39	J
Methyl methacrylate							1.0	U	1.0	UJ	1.0	U	1.0	UJ
4-Methyl-2-pentanone	18	U	2900	U	2600	U	10	U	10	UJ	10	U	10	UJ
Methyl tert-butyl ether	18	U	2900	U	2600	U								
Naphthalene			1400	J	660	UJ								
1,2-Dibromo-3-chloro-propane			1400	U	1300	U								
n-Propylbenzene			350	J	660	U								
Propionitrile							4.0	U	4.0	UJ	4.0	U	4.0	UJ
Styrene	4.6	U	720	U	660	U	1.0	U	1.0	UJ	1.0	U	1.0	UJ
1,1,1,2-Tetrachloroethane			720	U	660	U	1.0	U	1.0	UJ	1.0	U	1.0	UJ
1,1,2,2-Tetrachloroethane	4.6	U	720	U	660	U	1.0	U	1.0	UJ	1.0	U	1.0	UJ

VOLATILE ORGANIC COMPOUNDS - DATA VALIDATION SUMMARY TABLES

Sample Number	**SOIL-9 (38-40)**		**SLG-9 (24-26)**		**SLG-9 (34-36)**		**EB-1**		**EB-2**		**EB-3**		**OB-14**	
Lab Sample Number	A8F140101-012		A8F140101-013		A8F140101-014		A8F140101-015		A8F140101-016		A8F140101-017		A8F140101-018	
Matix	Solid		Solid		Solid		Water		Water		Water		Water	
Analyte	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Units	ug/Kg		ug/Kg		ug/Kg		ug/L		ug/L		ug/L		ug/L	
Tetrachloroethene	4.6	U	720	U	660	U	1.0	U	1.0	UJ	1.0	U	1.0	UJ
Toluene	4.6	U	970		280	J	0.85	J	0.62	J	0.70	J	1.0	UJ
1,2,3-Trichlorobenzene			720	U	660	U								
1,2,4-Trichlorobenzene			720	U	660	U								
1,1,1-Trichloroethane	4.6	U	720	U	660	U	1.0	U	1.0	UJ	1.0	U	1.0	UJ
1,1,2-Trichloroethane	4.6	U	720	U	660	U	1.0	U	1.0	UJ	1.0	U	1.0	UJ
Trichloroethene	4.6	U	720	U	660	U	1.0	U	1.0	UJ	1.0	U	1.0	UJ
Trichlorofluoromethane	9.2	U	1400	U	1300	U	2.0	U	2.0	UJ	2.0	U	2.0	UJ
1,2,3-Trichloropropane			720	U	660	U	1.0	U	1.0	UJ	1.0	U	1.0	UJ
1,2,4-Trimethylbenzene			1700		270	J								
1,3,5-Timethylbenzene			1700		660	U								
Vinyl acetate							2.0	U	2.0	UJ	2.0	U	2.0	UJ
Vinyl chloride							2.0	U	2.0	UJ	2.0	U	2.0	UJ
Xylenes							1.0	U	1.0	UJ	1.0	U	1.0	UJ

VOLATILE ORGANIC COMPOUNDS - DATA VALIDATION SUMMARY TABLES

Sample Number	**OB-10**		**W4R**		**DUP-10**		**TB-1**		**SLG-6 (16-18)**		**SLG-6 (48-50)**		**SLG-7 (32-34)**	
Lab Sample Number	A8F110143-001		A8F110143-002		A8F110143-003		A8F110143-004		A8F110143-006		A8F110143-007		A8F110143-010	
Matix	Water		Water		Water		Water		Solid		Solid		Solid	
Analyte	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Units	ug/L		ug/L		ug/L		ug/L		ug/Kg		ug/Kg		ug/Kg	
Acetone	10	UJ	10	UJ	10	UJ	10	UJ	2500	J	2200	UJ	2300	UJ
Acetonitrile	20	UJ	20	UJ	20	UJ	20	UJ	12000	U	11000	U	11000	U
Acrolein	20	UJ	20	UJ	20	UJ	20	UJ						
Acrylonitrile	20	U	20	U	20	U	20	U	12000	UJ	11000	UJ	11000	UJ
Allyl chloride	2.0	U	2.0	U	2.0	U	2.0	U						
Benzene	1.0	U	1.0	U	1.0	U	1.0	U	590	U	550	U	570	U
Bromodichloromethane	1.0	U	1.0	U	1.0	U	1.0		590	U	550	U	570	U
Bromoform	1.0	U	1.0	U	1.0	U	1.0	U	590	U	550	U	570	U
Bromobenzene														
Bromomethane	2.0	U	2.0	U	2.0	U	2.0	U	1200	U	1100	U	1100	U
2-Butanone	10	U	10	U	10	U	10	U	2600		2200	U	2300	U
n-Butylbenzene									320	J	260	J	1100	
sec-Butylbenzene									590	U	550	U	940	
tert-Butylbenzene									590	U	550	U	570	U
Carbon disulfide	1.0	U	1.0	U	1.0	U	1.0	U	590	U	550	U	570	U
Carbon tetrachloride	1.0	U	1.0	U	1.0	U	1.0	U	590	U	550	U	570	U
Chlorobenzene	1.0	U	1.0	U	1.0	U	1.0	U	590	U	550	U	570	U
Clorodibromomethane									590	U	550	U	570	U
Chloroethane	2.0	U	2.0	U	2.0	U	2.0	U	1200	U	1100	U	1100	U
Chloroform	1.0	U	1.0	U	1.0	U	1.0	U	590	U	550	U	570	U
Chloromethane	2.0	U	2.0	U	2.0	U	2.0	U	1200	U	1100	U	1100	U
Chloroprene	1.0	U	1.0	U	1.0	U	1.0	U						

VOLATILE ORGANIC COMPOUNDS - DATA VALIDATION SUMMARY TABLES

Sample Number	**OB-10**		**W4R**		**DUP-10**		**TB-1**		**SLG-6 (16-18)**		**SLG-6 (48-50)**		**SLG-7 (32-34)**	
Lab Sample Number	A8F110143-001		A8F110143-002		A8F110143-003		A8F110143-004		A8F110143-006		A8F110143-007		A8F110143-010	
Matix	Water		Water		Water		Water		Solid		Solid		Solid	
Analyte	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Units	ug/L		ug/L		ug/L		ug/L		ug/Kg		ug/Kg		ug/Kg	
2-Chlorotoluene									590	U	550	U	570	U
4-Chlorotoluene									590	U	550	U	570	U
Dibromochloromethane	1.0	U	1.0	U	1.0	U	1.0	U						
1,2-Dibromo-3-chloropropane	2.0	U	2.0	U	2.0	U	2.0	U						
1,2-Dibromoethane	1.0	U	1.0	U	1.0	U	1.0	U	590	U	550	U	570	U
Dibromomethane	1.0	U	1.0	U	1.0	U	1.0	U	590	U	550	U	570	U
m-Dichlorobenzene									590	U	550	U	570	U
p-Dichlorobenzene									590	U	550	U	570	U
o-Dichlorobenzene									590	U	550	U	570	U
Trans-1,4-dichloro-2-butene	1.0	U	1.0	U	1.0	U	1.0	U	590	U	550		570	
Dichlorodifluoromethane	2.0	U	2.0	U	2.0	U	2.0	U	1200	U	1100	U	1100	U
1,1-Dichloroethane	1.0	U	1.0	U	1.0	U	1.0	U	590	U	550	U	570	U
1,2-Dichloroethane	1.0	U	1.0	U	1.0	U	1.0	U	590	U	550	U	570	U
cis-1,2-Dichloroethene									300	U	270	U	290	U
trans-1,2-Dichloroethene	0.50	U	0.50	U	0.50	U	0.50	U	300	U	270	U	290	U
1,1-Dichloroethene	1.0	U	1.0	U	1.0	U	1.0	U	590	U	550	U	570	U
Dichlorofluoromethane									1200	U	1100	U	1100	U
1,2-Dichloropropane	1.0	U	1.0	U	1.0	U	1.0	U	590	U	550	U	570	U
1,3-Dichloropropane									590	U	550	U	570	U
2,2-Dichloropropane									590	U	550	U	570	U

VOLATILE ORGANIC COMPOUNDS - DATA VALIDATION SUMMARY TABLES

Sample Number	OB-10		W4R		DUP-10		TB-1		SLG-6 (16-18)		SLG-6 (48-50)		SLG-7 (32-34)	
Lab Sample Number	A8F110143-001		A8F110143-002		A8F110143-003		A8F110143-004		A8F110143-006		A8F110143-007		A8F110143-010	
Matix	Water		Water		Water		Water		Solid		Solid		Solid	
Analyte	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Units	ug/L		ug/L		ug/L		ug/L		ug/Kg		ug/Kg		ug/Kg	
cis-1,3-Dichloropropene	1.0	U	1.0	U	1.0	U	1.0	U	590	U	550	U	570	U
trans-1,3-Dichloropropene	1.0	U	1.0	U	1.0	U	1.0	U	590	U	550	U	570	U
1,1-Dichloropropene									590	U	550	U	570	U
1,4-Dioxane	200	UJ	200	UJ	200	UJ	200	UJ	59000	UJ	55000	UJ	57000	UJ
Ethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	590	U	550	U	180	J
Ethyl Methacrylate	1.0	U	1.0	U	1.0	U	1.0	U						
Freon 113									590	U	550	U	570	U
Hexachlorobutadiene									590	U	550	U	570	U
2-Hexanone	10	U	10	U	10	U	10	U	2400	U	2200	U	2300	U
Iodomethane	1.0	U	1.0	U	1.0	U	1.0	U	590	U	550	U	570	U
Isobutyl alcohol	50	UJ	50	UJ	50	UJ	50	UJ						
Isopropylbenzene									590	U	550	U	570	U
p-Isopropyltoluene									590	U	550	U	570	
Methacrylonitrile	1.0	U	1.0	U	1.0	U	1.0	U						
Methylene chloride	1.0	U	1.0	U	1.0	U	0.32	J	590	U	550	U	570	U
Methyl methacrylate	1.0	U	1.0	U	1.0	U	1.0	U						
4-Methyl-2-pentanone	10	U	10	U	10	U	10	U	2400	U	2200	U	2300	U
Methyl tert-butyl ether									2400	U	2200		2300	
Naphthalene									960	J	550	UJ	1700	J
1,2-Dibromo-3-chloro-propane									1200	U	1100	U	1100	U

VOLATILE ORGANIC COMPOUNDS - DATA VALIDATION SUMMARY TABLES

Sample Number	**OB-10**		**W4R**		**DUP-10**		**TB-1**		**SLG-6 (16-18)**		**SLG-6 (48-50)**		**SLG-7 (32-34)**	
Lab Sample Number	A8F110143-001		A8F110143-002		A8F110143-003		A8F110143-004		A8F110143-006		A8F110143-007		A8F110143-010	
Matix	Water		Water		Water		Water		Solid		Solid		Solid	
Analyte	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Units	ug/L		ug/L		ug/L		ug/L		ug/Kg		ug/Kg		ug/Kg	
n-Propylbenzene									590	U	550	U	520	J
Propionitrile	4.0	U	4.0	U	4.0	U	4.0	U						
Styrene	1.0	U	1.0	U	1.0	U	1.0	U	590	U	550	U	570	U
1,1,1,2-Tetrachloroethane	1.0	U	1.0	U	1.0	U	1.0	U	590	U	550	U	570	U
1,1,2,2-Tetrachloroethane	1.0	U	1.0	U	1.0	U	1.0	U	590	U	550	U	570	U
Tetrachloroethene	1.0	U	1.0	U	1.0	U	1.0	U	590	U	550	U	570	U
Toluene	1.0	U	1.0	U	1.0	U	1.0	U	590	U	170	J	710	
1,2,3-Trichlorobenzene									590	U	550	U	570	U
1,2,4-Trichlorobenzene									590	U	550	U	570	U
1,1,1-Trichloroethane	1.0	U	1.0	U	1.0	U	1.0	U	590	U	550	U	570	U
1,1,2-Trichloroethane	1.0	U	1.0	U	1.0	U	1.0	U	590	U	550	U	570	U
Trichloroethene	1.0	U	1.0	U	1.0	U	1.0	U	590	U	550	U	570	U
Trichlorofluoromethane	2.0	U	2.0	U	2.0	U	2.0	U	1200	U	1100	U	1100	U
1,2,3-Trichloropropane	1.0	U	1.0	U	1.0	U	1.0	U	590	U	550	U	570	U
1,2,4-Trimethylbenzene									520	J	490	J	2400	
1,3,5-Timethylbenzene									190	J	230	J	2600	
Vinyl acetate	2.0	U	2.0	U	2.0	U	2.0	U						
Vinyl chloride	2.0	U	2.0	U	2.0	U	2.0	U						
Xylenes	1.0	U	1.0	U	1.0	U	1.0	U						

VOLATILE ORGANIC COMPOUNDS - DATA VALIDATION SUMMARY TABLES

Sample Number	**SR-1**		**SW-1**		**SW-2**		**SW-3**		**SW-4**		**DUP-11**			
Lab Sample Number	A8F140101-019		A8F140101-020		A8F140101-021		A8F140101-022		A8F140101-023		A8F140101-024			
Matix	Water		Water		Water		Water		Water		Water			
% Soilds														
Analyte	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual		
Units	ug/L		ug/L		ug/L		ug/L		ug/L		ug/L			
Acetone	10	UJ	6.3	J	7.2	J	28	J	20	J	19	J		
Acetonitrile	20	UJ	20	UJ	20	UJ	20	UJ	20	UJ	20	UJ		
Acrolein	20	UJ	20	UJ	20	UJ	20	UJ	20	UJ	20	UJ		
Acrylonitrile	20	UJ	20	UJ	20	U	20	UJ	20	UJ	20	UJ		
Allyl chloride	2.0	UJ	2.0	UJ	2.0	U	2.0	UJ	2.0	UJ	2.0	UJ		
Benzene	1.0	UJ	1.0	UJ	1.0	U	1.0	UJ	1.0	UJ	1.0	UJ		
Bromodichloromethane	1.0	UJ	1.0	UJ	1.0	U	1.0	UJ	1.0	UJ	1.0	UJ		
Bromoform	1.0	UJ	1.0	UJ	1.0	U	1.0	UJ	1.0	UJ	1.0	UJ		
Bromobenzene	2.0	UJ	1.0	UJ	1.0	U	1.0	UJ	1.0	UJ	1.0	UJ		
Bromomethane	2.0	UJ	2.0	UJ	2.0	U	2.0	UJ	2.0	UJ	2.0	UJ		
2-Butanone	10	UJ	10	UJ	10	U	10	UJ	10	UJ	10	UJ		
n-Butylbenzene														
sec-Butylbenzene														
tert-Butylbenzene														
Carbon disulfide	1.0	UJ	1.0	UJ	1.0	U	1.0	UJ	1.0	UJ	1.0	UJ		
Carbon tetrachloride	1.0	UJ	1.0	UJ	1.0	U	1.0	UJ	1.0	UJ	1.0	UJ		
Chlorobenzene	1.0	UJ	1.0	UJ	1.0	U	1.0	UJ	1.0	UJ	1.0	UJ		
Clorodibromomethane	1.0	UJ	1.0	UJ	1.0	U	1.0	UJ	1.0	UJ	1.0	UJ		
Chloroethane	2.0	UJ	2.0	UJ	2.0	U	2.0	UJ	2.0	UJ	2.0	UJ		
Chloroform	1.0	UJ	1.0	UJ	1.0	U	1.0	UJ	1.0	UJ	1.0	UJ		
Chloromethane	2.0	UJ	2.0	UJ	2.0	U	2.0	UJ	1.0	UJ	1.0	UJ		
Chloroprene														
2-Chlorotoluene														
4-Chlorotoluene														
Dibromochloromethane	1.0	UJ	1.0	UJ	1.0	U	1.0	UJ	1.0	UJ	1.0	UJ		

VOLATILE ORGANIC COMPOUNDS - DATA VALIDATION SUMMARY TABLES

Sample Number	**SR-1**		**SW-1**		**SW-2**		**SW-3**		**SW-4**		**DUP-11**			
Lab Sample Number	A8F140101-019		A8F140101-020		A8F140101-021		A8F140101-022		A8F140101-023		A8F140101-024			
Matix	Water		Water		Water		Water		Water		Water			
% Soilds														
Analyte	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual		
Units	ug/L		ug/L		ug/L		ug/L		ug/L		ug/L			
1,2-Dibromo-3-chloropropane	2.0	UJ	2.0	UJ	2.0	U	2.0	UJ	2.0	UJ	2.0	UJ		
1,2-Dibromoethane	1.0	UJ	1.0	UJ	1.0	U	1.0	UJ	1.0	UJ	1.0	UJ		
Dibromomethane	1.0	UJ	1.0	UJ	1.0	U	1.0	UJ	1.0	UJ	1.0	UJ		
m-Dichlorobenzene														
p-Dichlorobenzene														
o-Dichlorobenzene														
Trans-1,4-dichloro-2-butene	1.0	UJ	1.0	UJ	1.0	U	1.0	UJ	1.0	UJ	1.0	UJ		
Dichlorodifluoromethane	2.0	UJ	2.0	UJ	2.0	U	2.0	UJ	2.0	UJ	2.0	UJ		
1,1-Dichloroethane	1.0	UJ	1.0	UJ	1.0	U	1.0	UJ	1.0	UJ	1.0	UJ		
1,2-Dichloroethane														
cis-1,2-Dichloroethene														
trans-1,2-Dichloroethene	0.50	UJ	0.50	UJ	0.50	U	0.50	UJ	0.50	UJ	0.50	UJ		
1,1-Dichloroethene	1.0	UJ	1.0	UJ	1.0	U	1.0	UJ	1.0	UJ	1.0	UJ		
Dichlorofluoromethane	2.0	UJ	2.0	UJ	2.0	UJ	2.0	UJ	2.0	UJ	2.0	UJ		
1,2-Dichloropropane	1.0	UJ	1.0	UJ	1.0	U	1.0	UJ	1.0	UJ	1.0	UJ		
1,3-Dichloropropane														
2,2-Dichloropropane														
cis-1,3-Dichloropropene	1.0	UJ	1.0	UJ	1.0	U	1.0	UJ	1.0	UJ	1.0	UJ		
trans-1,3-Dichloropropene	1.0	UJ	1.0	UJ	1.0	U	1.0	UJ	1.0	UJ	1.0	UJ		
1,1-Dichloropropene														
1,4-Dioxane	200	UJ	200	UJ	200	UJ	200	UJ	200	UJ	200	UJ		
Ethylbenzene	1.0	UJ	1.0	UJ	1.0	U	1.0	UJ	1.0	UJ	1.0	UJ		
Ethyl Methacrylate	1.0	UJ	1.0	UJ	1.0	U	1.0	UJ	1.0	UJ	1.0	UJ		
Freon 113														

VOLATILE ORGANIC COMPOUNDS - DATA VALIDATION SUMMARY TABLES

Sample Number	**SR-1**		**SW-1**		**SW-2**		**SW-3**		**SW-4**		**DUP-11**			
Lab Sample Number	A8F140101-019		A8F140101-020		A8F140101-021		A8F140101-022		A8F140101-023		A8F140101-024			
Matix	Water		Water		Water		Water		Water		Water			
% Soilds														
Analyte	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual		
Units	ug/L		ug/L		ug/L		ug/L		ug/L		ug/L			
Hexachlorobutadiene														
2-Hexanone	10	UJ	10	UJ	10	U	10	UJ	10	UJ	10	UJ		
Iodomethane	1.0	UJ	1.0	UJ	1.0	U	1.0	UJ	1.0	UJ	1.0	UJ		
Isobutyl alcohol			50	UJ	50	UJ	50	UJ	50	UJ	50	UJ		
Isopropylbenzene														
p-Isopropyltoluene														
Methacrylonitrile	1.0	UJ	1.0	UJ	1.0	U	1.0	UJ	1.0	UJ	1.0	UJ		
Methylene chloride	0.77	J	1.1	J	0.60	J	0.92	J	0.35	J	0.31	J		
Methyl methacrylate	1.0	UJ	1.0	UJ	1.0	U	1.0	UJ	1.0	UJ	1.0	UJ		
4-Methyl-2-pentanone	10	UJ	10	UJ	10	U	10	UJ	10	UJ	10	UJ		
Methyl tert-butyl ether														
Naphthalene														
1,2-Dibromo-3-chloro-propane														
n-Propylbenzene														
Propionitrile	4.0	UJ	4.0	UJ	4.0	U	4.0	UJ	4.0	UJ	4.0	UJ		
Styrene	1.0	UJ	1.0	UJ	1.0	U	1.0	UJ	1.0	UJ	1.0	UJ		
1,1,1,2-Tetrachloroethane	1.0	UJ	1.0	UJ	1.0	U	1.0	UJ	1.0	UJ	1.0	UJ		
1,1,2,2-Tetrachloroethane	1.0	UJ	1.0	UJ	1.0	U	1.0	UJ	1.0	UJ	1.0	UJ		
Tetrachloroethene	1.0	UJ	1.0	UJ	1.0	U	1.0	UJ	1.0	UJ	1.0	UJ		
Toluene	1.0	UJ	1.0	UJ	0.59	J	1.0	UJ	0.39	J	0.33	J		
1,2,3-Trichlorobenzene														
1,2,4-Trichlorobenzene														
1,1,1-Trichloroethane	1.0	UJ	1.0	UJ	1.0	U	1.0	UJ	1.0	UJ	1.0	UJ		
1,1,2-Trichloroethane	1.0	UJ	1.0	UJ	1.0	U	1.0	UJ	1.0	UJ	1.0	UJ		

VOLATILE ORGANIC COMPOUNDS - DATA VALIDATION SUMMARY TABLES

Sample Number	**SR-1**		**SW-1**		**SW-2**		**SW-3**		**SW-4**		**DUP-11**			
Lab Sample Number	A8F140101-019		A8F140101-020		A8F140101-021		A8F140101-022		A8F140101-023		A8F140101-024			
Matix	Water		Water		Water		Water		Water		Water			
% Soilds														
Analyte	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual		
Units	ug/L		ug/L		ug/L		ug/L		ug/L		ug/L			
Trichloroethene	1.0	UJ	1.0	UJ	1.0	U	1.0	UJ	1.0	UJ	1.0	UJ		
Trichlorofluoromethane	2.0	UJ	2.0	UJ	2.0	U	2.0	UJ	1.0	UJ	1.0	UJ		
1,2,3-Trichloropropane	1.0	UJ	1.0	UJ	1.0	U	1.0	UJ	1.0	UJ	1.0	UJ		
1,2,4-Trimethylbenzene														
1,3,5-Timethylbenzene														
Vinyl acetate	2.0	UJ	2.0	UJ	2.0	U	2.0	UJ	2.0	UJ	2.0	UJ		
Vinyl chloride	2.0	UJ	2.0	UJ	2.0	U	2.0	UJ	2.0	UJ	2.0	UJ		
Xylenes	1.0	UJ	1.0	UJ	1.0	U	1.0	UJ	1.0	UJ	1.0	UJ		

VOLATILE ORGANIC COMPOUNDS - DATA VALIDATION SUMMARY TABLES

Sample Number	TB-2		TB-3		SOIL-7(51.5-53)									
Lab Sample Number	A8F140101-025		A8F140101-026		A8F110143-013									
Matix	Water		Water		Solid									
% Soilds														
Analyte	Result	Qual	Result	Qual	Result	Qual								
Units	ug/L		ug/L		ug/Kg									
Acetone	10	UJ	10	UJ	27	UJ								
Acetonitrile	20	UJ	20	UJ										
Acrolein	20	UJ	20	UJ										
Acrylonitrile	20	UJ	20	UJ	140	U								
Allyl chloride	2.0	UJ	2.0	UJ										
Benzene	1.0	UJ	1.0	UJ	6.9	U								
Bromodichloromethane	1.0	UJ	1.0	UJ	6.9	U								
Bromoform	1.0	UJ	1.0	UJ	6.9	U								
Bromobenzene														
Bromomethane	2.0	UJ	2.0	UJ	14	UJ								
2-Butanone	10	UJ	10	UJ	27	UJ								
n-Butylbenzene														
sec-Butylbenzene														
tert-Butylbenzene														
Carbon disulfide	1.0	UJ	1.0	UJ	6.9	U								
Carbon tetrachloride	1.0	UJ	1.0	UJ	6.9	U								
Chlorobenzene	1.0	UJ	1.0	UJ	6.9	U								
Clorodibromomethane					6.9	U								
Chloroethane	2.0	UJ	2.0	UJ	14	U								
Chloroform	1.0	UJ	1.0	UJ	6.9	U								
Chloromethane	2.0	UJ	2.0	UJ	14	U								
Chloroprene	1.0	UJ	1.0	UJ										
2-Chlorotoluene														
4-Chlorotoluene														
Dibromochloromethane	1.0	UJ	1.0	UJ										

VOLATILE ORGANIC COMPOUNDS - DATA VALIDATION SUMMARY TABLES

Sample Number	**TB-2**		**TB-3**		**SOIL-7(51.5-53)**									
Lab Sample Number	A8F140101-025		A8F140101-026		A8F110143-013									
Matix	Water		Water		Solid									
% Soilds														
Analyte	Result	Qual	Result	Qual	Result	Qual								
Units	ug/L		ug/L		ug/Kg									
1,2-Dibromo-3-chloropropane	2.0	UJ	2.0	UJ	6.9	U								
1,2-Dibromoethane	1.0	UJ	1.0	UJ										
Dibromomethane	1.0	UJ	1.0	UJ										
m-Dichlorobenzene					6.9	U								
p-Dichlorobenzene					6.9	U								
o-Dichlorobenzene					6.9	U								
Trans-1,4-dichloro-2-butene	1.0	UJ	1.0	UJ										
Dichlorodifluoromethane	2.0	UJ	2.0	UJ	14	U								
1,1-Dichloroethane	1.0	UJ	1.0	UJ	6.9	U								
1,2-Dichloroethane	1.0	UJ	1.0	UJ	6.9	U								
cis-1,2-Dichloroethene					3.4	U								
trans-1,2-Dichloroethene	0.50	UJ	0.50	UJ	3.4	U								
1,1-Dichloroethene	1.0	UJ	1.0	UJ	6.9	U								
Dichlorofluoromethane	2.0	UJ	2.0	UJ										
1,2-Dichloropropane	1.0	UJ	1.0	UJ	6.9	U								
1,3-Dichloropropane														
2,2-Dichloropropane														
cis-1,3-Dichloropropene	1.0	UJ	1.0	UJ	6.9	U								
trans-1,3-Dichloropropene	1.0	UJ	1.0	UJ	6.9	U								
1,1-Dichloropropene														
1,4-Dioxane	200	UJ	200	UJ	690	UJ								
Ethylbenzene	1.0	UJ	1.0	UJ	6.9	U								
Ethyl Methacrylate	1.0	UJ	1.0	UJ										
Freon 113														

VOLATILE ORGANIC COMPOUNDS - DATA VALIDATION SUMMARY TABLES

Sample Number	TB-2		TB-3		SOIL-7(51.5-53)									
Lab Sample Number	A8F140101-025		A8F140101-026		A8F110143-013									
Matix	Water		Water		Solid									
% Soilds														
Analyte	Result	Qual	Result	Qual	Result	Qual								
Units	ug/L		ug/L		ug/Kg									
Hexachlorobutadiene														
2-Hexanone	10	UJ	10	UJ	27	U								
Iodomethane	1.0	UJ	1.0	UJ										
Isobutyl alcohol	50	UJ	50	UJ										
Isopropylbenzene														
p-Isopropyltoluene														
Methacrylonitrile	1.0	UJ	1.0	UJ										
Methylene chloride	0.94	J	0.98	J	6.9	U								
Methyl methacrylate	1.0	UJ	1.0	UJ										
4-Methyl-2-pentanone	10	UJ	10	UJ	27	U								
Methyl tert-butyl ether					27	U								
Naphthalene														
1,2-Dibromo-3-chloro-propane														
n-Propylbenzene														
Propionitrile	4.0	UJ	4.0	UJ										
Styrene	1.0	UJ	1.0	UJ	6.9	U								
1,1,1,2-Tetrachloroethane	1.0	UJ	1.0	UJ										
1,1,2,2-Tetrachloroethane	1.0	UJ	1.0	UJ	6.9	U								
Tetrachloroethene	1.0	UJ	1.0	UJ	6.9	U								
Toluene	0.28	J	0.26	J	3.7	J								
1,2,3-Trichlorobenzene														
1,2,4-Trichlorobenzene														
1,1,1-Trichloroethane	1.0	UJ	1.0	UJ	6.9	U								
1,1,2-Trichloroethane	1.0	UJ	1.0	UJ	6.9	U								

VOLATILE ORGANIC COMPOUNDS - DATA VALIDATION SUMMARY TABLES

Sample Number	TB-2		TB-3		SOIL-7(51.5-53)									
Lab Sample Number	A8F140101-025		A8F140101-026		A8F110143-013									
Matix	Water		Water		Solid									
% Soilds														
Analyte	Result	Qual	Result	Qual	Result	Qual								
Units	ug/L		ug/L		ug/Kg									
Trichloroethene	1.0	UJ	1.0	UJ	6.9	U								
Trichlorofluoromethane	2.0	UJ	2.0	UJ	14	U								
1,2,3-Trichloropropane	1.0	UJ	1.0	UJ		U								
1,2,4-Trimethylbenzene														
1,3,5-Timethylbenzene														
Vinyl acetate	2.0	UJ	2.0	UJ										
Vinyl chloride	2.0	UJ	2.0	UJ										
Xylenes	1.0	UJ	1.0	UJ										

TCLP VOLATILES - DATA VALIDATION SUMMARY TABLES

Sample Number	**PRS-1**													
Lab Sample Number	A8F110143-008													
Matix	Solid													
Analyte	Result	Qual												
Units	mg/L													
Benzene	0.025	U												
Carbon tetrachloride	0.025	U												
Chlorobenzene	0.025	U												
Chloroform	0.025	U												
1,2-Dichloroethane	0.025	U												
1,1-Dichloroethylene	0.025	U												
Methyl ethyl ketone	0.063	J												
Tetrachloroethylene	0.025	U												
Trichloroethylene	0.025	U												
Vinyl chloride	0.050	U												

GC/MS SEMIVOLATILES - DATA VALIDATION SUMMARY TABLES

Sample Number	SLG-9 (34-36)		EB-1		EB-2		EB-3		OB-14		SR-1	
Lab Sample Number	A8F140101-014		A8F140101-015		A8F140101-016		A8F140101-017		A8F140101-018		A8F140101-019	
Matix	Solid		Water		Water		Water		Water		Water	
Analyte	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Units	ug/Kg		ug/L		ug/L		ug/L		ug/L		ug/L	
Acenaphthene	870	U	10	U	10	U	10	U	10	U	10	U
Acenaphthylene	870	U	10	U	10	U	10	U	10	U	10	U
Acetophenone	300	J	10	U	10	U	10	U	10	U	10	U
2-Acetylaminofluorene	8700	U	100	U	100	U	100	U	100	U	100	U
4-Aminobiphenyl	4200	U	50	U	50	U	50	U	50	U	50	U
Aniline	870	U	10	U	10	U	10	U	10	U	10	U
Anthracene	870	U	10	U	10	U	10	U	10	U	10	U
Aramite	1700	U	20	U	20	U	20	U	20	U	20	U
Benzo(a)anthracene	870	U	10	U	10	U	10	U	10	U	10	U
Benzo(a)pyrene	870	U	10	U	10	U	10	U	10	U	10	U
Benzo(b)fluoranthene	870	U	10	U	10	U	10	U	10	U	10	U
Benzo(ghi)perylene	870	U	10	U	10	U	10	U	10	U	10	U
Benzo(k)fluoranthene	870	U	10	U	10	U	10	U	10	U	10	U
Benzyl alcohol	870	U	10	U	10	U	10	U	10	U	10	U
4-Bromophenyl phenyl ether	870	U	10	U	10	U	10	U	10	U	10	U
Butyl benzyl phthalate	870	U	10	U	10	U	10	U	10	U	10	U
2-sec-Butyl-4,6-dinitrophenol	1700	U	20	U	20	U	20	U	20	U	20	U
4-Chloroaniline	870	U	10	U	10	U	10	U	10	U	10	U
Chlorobenzilate	870	U	10	U	10	U	10	U	10	U	10	U
bis(2-Chloroethoxy)methane	870	U	10	U	10	U	10	U	10	U	10	U
bis(2-Chloroethyl)ether	870	U	10	U	10	U	10	U	10	U	10	U
bis(2-Chloro-1-methylethyl)ether	870	U	10	U	10	U	10	U	10	U	10	U
4-Chloro-2-methylphenol	870	U	10	U	10	U	10	U	10	U	10	U
2-Chloronaphthalene	870	U	10	U	10	U	10	U	10	U	10	U
2-Chlorophenol	870	U	10	U	10	U	10	U	10	U	10	U
4-Chlorophenyl phenyl ether	870	U	10	U	10	U	10	U	10	U	10	U
Chrysene	870	U	10	U	10	U	10	U	10	U	10	U
Diallate	1700	U	20	U	20	U	20	U	20	U	20	U
Dibenz(a,h)anthracene	870	U	10	U	10	U	10	U	10	U	10	U

GC/MS SEMIVOLATILES - DATA VALIDATION SUMMARY TABLES

Sample Number	SLG-9 (34-36)		EB-1		EB-2		EB-3		OB-14		SR-1	
Lab Sample Number	A8F140101-014		A8F140101-015		A8F140101-016		A8F140101-017		A8F140101-018		A8F140101-019	
Matix	Solid		Water		Water		Water		Water		Water	
Analyte	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Units	ug/Kg		ug/L		ug/L		ug/L		ug/L		ug/L	
Dibenzofuran	870	U	10	U	10	U	10	U	10	U	10	U
Di-n-butyl phthalate	870	U	10	U	10	U	10	U	10	U	10	U
1,2-Dichlorobenzene	870	U	10	U	10	U	10	U	10	U	10	U
1,3-Dichlorobenzene	870	U	10	U	10	U	10	U	10	U	10	U
1,4-Dichlorobenzene	870	U	10	U	10	U	10	U	10	U	10	U
3,3'-Dichlorobenzidine	4200	U	50	U	50	U	50	U	50	U	50	U
2,4-Dichlorophenol	870	U	10	U	10	U	10	U	10	U	10	U
2,6-Dichlorophenol	870	U	10	U	10	U	10	U	10	U	10	U
Diethyl phthalate	870	U	10	U	10	U	10	U	10	U	10	U
Dimethoate	1700	U	20	U	20	U	20	U	20	U	20	U
p-Dimethylaminoazobenzene	1700	U	20	U	20	U	20	U	20	U	20	U
Disulfoton	4200	U	50	U	50	U	50	U	50	U	50	U
7,12-Dimethylbenz(a)-anthracene	1700	U	20	U	20	U	20	U	20	U	20	U
3,3'-Dimethylbenzidine	4200	U	50	U	50	U	50	U	50	U	50	U
a,a-Dimethylphenethylamine	4200	U	50	U	50	U	50	U	50	U	50	U
2,4-Dimethylphenol	870	U	10	U	10	U	10	U	10	U	10	U
Dimethyl phthalate	870	U	10	U	10	U	10	U	10	U	10	U
1,3-Dinitrobenzene	870	U	10	U	10	U	10	U	10	U	10	U
4,6-Dinitro-2-methylphenol	4200	U	50	U	50	U	50	U	50	U	50	U
2,4-Dinitrophenol	4200	U	50	U	50	U	50	U	50	U	50	U
2,4-Dinitrotoluene	870	U	10	U	10	U	10	U	10	U	10	U
2,6-Dinitrotoluene	870	U	10	U	10	U	10	U	10	U	10	U
Di-n-octyl phthalate	870	U	10	U	10	U	10	U	10	U	10	U
Diphenylamine	870	U	10	U	10	U	10	U	10	U	10	U
bis(2-Ethylhexyl)phthalate	680	J	10	U	10	U	3.2	J	10	U	10	U
Ethyl methanesulfonate	870	U	10	U	10	U	10	U	10	U	10	U
Famphur	8700	UJ	100	UJ	100	UJ	100	UJ	100	UJ	100	UJ
Fluoranthene	870	U	10	U	10	U	10	U	10	U	10	U
Fluorene	870	U	10	U	10	U	10	U	10	U	10	U

GC/MS SEMIVOLATILES - DATA VALIDATION SUMMARY TABLES

Sample Number	SLG-9 (34-36)		EB-1		EB-2		EB-3		OB-14		SR-1	
Lab Sample Number	A8F140101-014		A8F140101-015		A8F140101-016		A8F140101-017		A8F140101-018		A8F140101-019	
Matix	Solid		Water		Water		Water		Water		Water	
Analyte	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Units	ug/Kg		ug/L		ug/L		ug/L		ug/L		ug/L	
Hexachlorobenzene	870	U	10	U	10	U	10	U	10	U	10	U
Hexachlorobutadiene	870	U	10	U	10	U	10	U	10	U	10	U
Hexachlorocyclopentadiene	4200	U	50	U	50	U	50	UJ	50	UJ	50	UJ
Hexachloroethane	870	U	10	U	10	U	10	U	10	U	10	U
Hexachloropropene	8700	U	100	U	100	U	100	U	100	U	100	U
IndenO(1,2,3-cd)pyrene	870	U	10	U	10	U	10	U	10	U	10	U
Isophorone	870	U	10	U	10	U	10	U	10	U	10	U
Isosafrole	1700	U	20	U	20	U	20	U	20	U	20	U
Methapyrilene	4200	UJ	50	UJ	50	U	50	U	50	U	50	U
3-Methylcholanthrene	1700	U	20	U	20	U	20	U	20	U	20	U
Methyl methanesulfonate	870	U	10	U	10	U	10	U	10	U	10	U
2-Methylnaphthalene	390	J	10	U	10	U	10	U	10	U	10	U
2-Methylphenol	220	J	10	U	10	U	10	U	10	U	10	U
3-Methylphenol	2700	#	10	U	10	U	10	U	10	U	10	U
4-Methylphenol	2700	#	10	U	10	U	10	U	10	U	10	U
Naphthalene	870	U	10	U	10	U	10	U	10	U	10	U
1,4-Naphthoquinone	4200	U	50	U	50	U	50	U	50	U	50	U
1-Naphthylamine	870	UJ	10	UJ	10	U	10	U	10	U	10	U
1-2-Naphthylamine	870	U	10	U	10	U	10	U	10	U	10	U
2-Nitroaniline	4200	U	50	U	50	U	50	U	50	U	50	U
3-Nitroaniline	4200	U	50	U	50	U	50	U	50	U	50	U
4-Nitroaniline	4200	U	50	U	50	U	50	U	50	U	50	U
Nitrobenzene	870	U	10	U	10	U	10	U	10	U	10	U
2-Nitrophenol	870	U	10	U	10	U	10	U	10	U	10	U
4-Nitrophenol	4200	U	50	U	50	U	50	U	50	U	50	U
4-Nitroquinoline-1-oxide	8700	U	100	U	100	U	100	UJ	100	UJ	100	UJ
N-Nitrosodi-n-butylamine	870	U	10	U	10	U	10	U	10	U	10	U
N-Nitrosodiethylamine	870	U	10	U	10	U	10	U	10	U	10	U

GC/MS SEMIVOLATILES - DATA VALIDATION SUMMARY TABLES

Sample Number	SLG-9 (34-36)		EB-1		EB-2		EB-3		OB-14		SR-1	
Lab Sample Number	A8F140101-014		A8F140101-015		A8F140101-016		A8F140101-017		A8F140101-018		A8F140101-019	
Matix	Solid		Water		Water		Water		Water		Water	
Analyte	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Units	ug/Kg		ug/L		ug/L		ug/L		ug/L		ug/L	
N-Nitrosodimethylamine	870	U	10	U	10	U	10	U	10	U	10	U
N-Nitrosodiphenylamine	870	U	10	U	10	U	10	U	10	U	10	U
N-Nitrosodi-n-propylamine	870	U	10	U	10	U	10	U	10	U	10	U
N-Nitrosomethylethylamine	870	U	10	U	10	U	10	U	10	U	10	U
N-Nitrosomorpholine	870	U	10	U	10	U	10	U	10	U	10	U
N-Nitrosopyrrolidine	870	U	10	U	10	U	10	U	10	U	10	U
5-Nitro-o-toluidine	1700	U	20	U	20	U	20	U	20	U	20	U
Pentachlorobenzene	870	U	10	U	10	U	10	U	10	U	10	U
Pentachloroethane	4200	U	50	U	50	U	50	U	50	U	50	U
Pentachloronitrobenzene	4200	U	50	U	50	U	50	U	50	U	50	U
Pentachlorophenol	870	U	10	U	10	U	10	U	10	U	10	U
Phenacetin	1700	U	20	U	20	U	20	U	20	U	20	U
Phenanthrene	870	U	10	U	10	U	10	U	10	U	10	U
Phenol	3500		1.4	J	10	U	10	U	10	U	10	U
p-Phenylene diamine	8700	UJ	100	UJ	100	UJ	100	UJ	100	UJ	100	UJ
Phorate	4200	U	50	U	50	U	50	U	50	U	50	U
2-Picoline	1700	U	20	U	20	U	20	U	20	U	20	U
Pronamide	1700	U	20	U	20	U	20	U	20	U	20	U
Pyrene	870	U	10	U	10	U	10	U	10	U	10	U
Pyridine	1700	U	20	U	20	U	20	U	20	U	20	U
Safrole	1700	U	20	U	20	U	20	U	20	U	20	U
Tetraethyldithiopyrophosphate	4200	U	50	U	50	U	50	U	50	U	50	U
1,2,4,5-Tetrachlorobenzene	870	U	10	U	10	U	10	U	10	U	10	U
2,3,4,6-Tetrachlorophenol	4200	U	50	U	50	U	50	U	50	U	50	U

GC/MS SEMIVOLATILES - DATA VALIDATION SUMMARY TABLES

Sample Number	SLG-9 (34-36)		EB-1		EB-2		EB-3		OB-14		SR-1	
Lab Sample Number	A8F140101-014		A8F140101-015		A8F140101-016		A8F140101-017		A8F140101-018		A8F140101-019	
Matix	Solid		Water		Water		Water		Water		Water	
Analyte	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Units	ug/Kg		ug/L		ug/L		ug/L		ug/L		ug/L	
Thionazin	4200	U	50	U	50	U	50	U	50	U	50	U
o-Toluidine	1700	U	20	U	20	U	20	U	20	U	20	U
1,2,4-Trichlorobenzene	870	U	10	U	10	U	10	U	10	U	10	U
2,4,5-Trichlorophenol	870	U	10	U	10	U	10	U	10	U	10	U
2,4,6-Trichlorophenol	870	U	10	U	10	U	10	U	10	U	10	U
O,O,O-Triethylphosphorothioate	4200	U	50	U	50	U	50	U	50	U	50	U
1,3,5-Trinitrobenzene	4200	U	50	U	50	U	50	U	50	U	50	U

GC/MS SEMIVOLATILES - DATA VALIDATION SUMMARY TABLES

Sample Number	OB-10		W4R		DUP-10		SOIL-6 (57.5-59)		SLG-6 (16-18)		SLG-6 (48-50)	
Lab Sample Number	A8F110143-001		A8F110143-002		A8F110143-003		A8F110143-005		A8F110143-006		A8F110143-007	
Matix	Water		Water		Water		Solid		Solid		Solid	
% Solids												
Analyte	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Units	ug/L		ug/L		ug/L		ug/Kg		ug/Kg		ug/Kg	
Acenaphthene	10	U	10	U	10	U	1600	U	3100	U	720	U
Acenaphthylene	10	U	10	U	10	U	1600	U	3100	U	720	U
Acetophenone	10	U	10	U	10	U	1600	U	3100	U	720	U
2-Acetylaminofluorene	100	U	100	U	100	U	16000	U	31000	U	7200	U
4-Aminobiphenyl	50	U	50	U	50	U	7600	U	15000	U	3500	U
Aniline	10	U	10	U	10	U	1600	U	3100	U	720	U
Anthracene	10	U	10	U	10	U	1600	U	3100	U	720	U
Aramite	20	U	20	U	20	U	3100	U	6300	U	1400	U
Benzo(a)anthracene	10	U	10	U	10	U	1600	U	3100	U	720	U
Benzo(a)pyrene	10	U	10	U	10	U	1600	U	3100	U	720	U
Benzo(b)fluoranthene	10	U	10	U	10	U	1600	U	3100	U	720	U
720Benzo(ghi)perylene	10	U	10	U	10	U	1600	U	3100	U	720	U
Benzo(k)fluoranthene	10	U	10	U	10	U	1600	U	3100	U	720	U
Benzyl alcohol	10	U	10	U	10	U	1600	U	3100	U	720	U
4-Bromophenyl phenyl ether	10	U	10	U	10	U	1600	U	3100	U	720	U
Butyl benzyl phthalate	10	U	10	U	10	U	1600	U	3100	U	1400	U
2-sec-Butyl-4,6-dinitrophenol	20	U	20	U	20	U	3100	U	6300	U	720	U
4-Chloroaniline	10	U	10	U	10	U	1600	U	3100	U	720	U
Chlorobenzilate	10	U	10	U	10	U	1600	U	3100	U	720	U
bis(2-Chloroethoxy)methane	10	U	10	U	10	U	1600	U	3100	U	720	U
bis(2-Chloroethyl)ether	10	U	10	U	10	U	1600	U	3100	U	720	U
bis(2-Chloro-1-methylethyl)ether	10	U	10	U	10	U	1600	U	3100	U	720	U
4-Chloro-2-methylphenol	10	U	10	U	10	U	1600	U	3100	U	720	U
2-Chloronaphthalene	10	U	10	U	10	U	1600	U	3100	U	720	U
2-Chlorophenol	10	U	10	U	10	U	1600	U	3100	U	720	U
4-Chlorophenyl phenyl ether	10	U	10	U	10	U	1600	U	3100	U	720	U
Chrysene	10	U	10	U	10	U	1600	U	3100	U	720	U
Diallate	20	U	20	U	20	U	3100	U	6300	U	1400	U
Dibenz(a,h)anthracene	10	U	10	U	10	U	1600	U	3100	U	720	U

GC/MS SEMIVOLATILES - DATA VALIDATION SUMMARY TABLES

Sample Number	OB-10		W4R		DUP-10		SOIL-6 (57.5-59)		SLG-6 (16-18)		SLG-6 (48-50)	
Lab Sample Number	A8F110143-001		A8F110143-002		A8F110143-003		A8F110143-005		A8F110143-006		A8F110143-007	
Matix	Water		Water		Water		Solid		Solid		Solid	
% Solids												
Analyte	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Units	ug/L		ug/L		ug/L		ug/Kg		ug/Kg		ug/Kg	
Dibenzofuran	10	U	10	U	10	U	1600	U	3100	U	720	U
Di-n-butyl phthalate	10	U	10	U	10	U	1600	U	3100	U	720	U
1,2-Dichlorobenzene	10	U	10	U	10	U	1600	U	3100	U	720	U
1,3-Dichlorobenzene	10	U	10	U	10	U	1600	U	3100	U	720	U
1,4-Dichlorobenzene	10	U	10	U	10	U	1600	U	3100	U	720	U
3,3'-Dichlorobenzidine	50	U	50	U	50	U	7600	U	15000	U	3500	U
2,4-Dichlorophenol	10	U	10	U	10	U	1600	U	3100	U	720	U
2,6-Dichlorophenol	10	U	10	U	10	U	1600	U	3100	U	720	U
Diethyl phthalate	10	U	10	U	10	U	1600	U	3100	U	720	U
Dimethoate	20	U	20	U	20	U	3100	U	6300	U	1400	U
p-Dimethylaminoazobenzene	20	U	20	U	20	U	3100	U	6300	U	1400	U
Disulfoton	50	U	50	U	50	U	7600	U	15000	U	3500	U
7,12-Dimethylbenz(a)-anthracene	20	U	20	U	20	U	3100	U	6300	U	1400	U
3,3'-Dimethylbenzidine	50	U	50	U	50	U	7600	U	15000	U	3500	U
a,a-Dimethylphenethylamine	50	U	50	U	50	U	7600	U	15000	U	3500	U
2,4-Dimethylphenol	10	U	10	U	10	U	1600	U	3100	U	720	U
Dimethyl phthalate	10	U	10	U	10	U	1600	U	3100	U	720	U
1,3-Dinitrobenzene	10	U	10	U	10	U	1600	U	3100	U	720	U
4,6-Dinitro-2-methylphenol	50	U	50	U	50	U	7600	U	15000	U	3500	U
2,4-Dinitrophenol	50	U	50	U	50	U	7600	U	15000	U	3500	U
2,4-Dinitrotoluene	10	U	10	U	10	U	1600	U	3100	U	720	U
2,6-Dinitrotoluene	10	U	10	U	10	U	1600	U	3100	U	720	U
Di-n-octyl phthalate	10	U	10	U	10	U	1600	U	3100	U	720	U
Diphenylamine	10	U	10	U	10	U	1600	U	3100	U	720	U
bis(2-Ethylhexyl)phthalate	10	U	2.8	B	10	U	1600	B	1700	J	490	J
Ethyl methanesulfonate	10	U	10	U	10	U	1600	U	3100	U	720	U
Famphur	100	UJ	100	UJ	100	UJ	16000	UJ	31000	UJ	7200	UJ
Fluoranthene	10	U	10	U	10	U	1600	U	3100	U	720	U
Fluorene	10	U	10	U	10	U	1600	U	3100	U	720	U

GC/MS SEMIVOLATILES - DATA VALIDATION SUMMARY TABLES

Sample Number	OB-10		W4R		DUP-10		SOIL-6 (57.5-59)		SLG-6 (16-18)		SLG-6 (48-50)	
Lab Sample Number	A8F110143-001		A8F110143-002		A8F110143-003		A8F110143-005		A8F110143-006		A8F110143-007	
Matix	Water		Water		Water		Solid		Solid		Solid	
% Solids												
Analyte	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Units	ug/L		ug/L		ug/L		ug/Kg		ug/Kg		ug/Kg	
Hexachlorobenzene	10	U	10	U	10	U	1600	U	3100	U	720	U
Hexachlorobutadiene	10	U	10	U	10	U	1600	U	3100	U	720	U
Hexachlorocyclopentadiene	50	UJ	50	U	50	U	7600	U	15000	U	3500	U
Hexachloroethane	10	U	10	U	10	U	1600	U	3100	U	720	U
Hexachloropropene	100	U	100	U	100	U	16000	U	31000	U	7200	U
Indeno1,2,3-cd)pyrene	10	U	10	U	10	U	1600	U	3100	U	720	U
Isophorone	10	U	10	U	10	U	1600	U	3100	U	720	U
Isosafrole	20	U	20	U	20	U	3100	U	6300	U	1400	U
Methapyrilene	50	U	50	U	50	U	7600	U	15000	U	3500	U
3-Methylcholanthrene	20	U	20	U	20	U	3100	U	6300	U	1400	U
Methyl methanesulfonate	10	U	10	U	10	U	1600	U	3100	U	720	U
2-Methylnaphthalene	10	U	10	U	10	U	1600	U	1100	J	170	J
2-Methylphenol	10	U	10	U	10	U	1600	U	3100	U	720	U
3-Methylphenol	10	U	10	U	10	U	1600	U	3300	#	720	U
4-Methylphenol	10	U	10	U	10	U	1600	U	3300	#	720	U
Naphthalene	10	U	10	U	10	U	1600	U	3100	U	720	U
1,4-Naphthoquinone	50	U	50	U	50	U	7600	U	15000	U	3500	U
1-Naphthylamine	10	U	10	U	10	U	1600	U	3100	U	720	U
1-2-Naphthylamine	10	U	10	U	10	U	1600	U	3100	U	720	U
2-Nitroaniline	50	U	50	U	50	U	7600	U	15000	U	3500	U
3-Nitroaniline	50	U	50	U	50	U	7600	U	15000	U	3500	U
4-Nitroaniline	50	U	50	U	50	U	7600	U	3100	U	3500	U
Nitrobenzene	10	U	10	U	10	U	1600	U	3100	U	720	U
2-Nitrophenol	10	U	10	U	10	U	1600	U	15000	U	720	U
4-Nitrophenol	50	U	50	U	50	U	7600	U	31000	U	3500	U
4-Nitroquinoline-1-oxide	100	UJ	100	U	100	U	16000	U	3100	U	7200	U
N-Nitrosodi-n-butylamine	10	U	10	U	10	U	1600	U	3100	U	720	U
N-Nitrosodiethylamine	10	U	10	U	10	U	1600	U	3100	U	720	U

GC/MS SEMIVOLATILES - DATA VALIDATION SUMMARY TABLES

Sample Number	OB-10		W4R		DUP-10		SOIL-6 (57.5-59)		SLG-6 (16-18)		SLG-6 (48-50)	
Lab Sample Number	A8F110143-001		A8F110143-002		A8F110143-003		A8F110143-005		A8F110143-006		A8F110143-007	
Matix	Water		Water		Water		Solid		Solid		Solid	
% Solids												
Analyte	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Units	ug/L		ug/L		ug/L		ug/Kg		ug/Kg		ug/Kg	
N-Nitrosodimethylamine	10	U	10	U	10	U	1600	U	3100	U	720	U
N-Nitrosodiphenylamine	10	U	10	U	10	U	1600	U	3100	U	720	U
N-Nitrosodi-n-propylamine	10	U	10	U	10	U	1600	U	3100	U	720	U
N-Nitrosomethylethylamine	10	U	10	U	10	U	1600	U	3100	U	720	U
N-Nitrosomorpholine	10	U	10	U	10	U	1600	U	3100	U	720	U
N-Nitrosopyrrolidine	10	U	10	U	10	U	1600	U	3100	U	720	U
5-Nitro-o-toluidine	20	U	20	U	20	U	3100	U	6300	U	1400	U
Pentachlorobenzene	10	U	10	U	10	U	1600	U	3100	U	720	U
Pentachloroethane	50	U	50	U	50	U	7600	U	15000	U	3500	U
Pentachloronitrobenzene	50	U	50	U	50	U	7600	U	15000	U	3500	U
Pentachlorophenol	10	U	10	U	10	U	1600	U	3100	U	720	U
Phenacetin	20	U	20	U	20	U	3100	U	6300	U	1400	U
Phenanthrene	10	U	10	U	10	U	1600	U	3100	U	720	U
Phenol	10	U	10	U	10	U	1600	U	620	J	720	U
p-Phenylene diamine	100	UJ	100	UJ	100	UJ	16000	UJ	31000	UJ	7200	UJ
Phorate	50	U	50	U	50	U	7600	U	15000	U	3500	U
2-Picoline	20	U	20	U	20	U	3100	U	6300	U	1400	U
Pronamide	20	U	20	U	20	U	3100	U	6300	U	1400	U
Pyrene	10	U	10	U	10	U	1600	U	6100	U	720	U
Pyridine	20	U	20	U	20	U	3100	U	6300	U	1400	U
Safrole	20	U	20	U	20	U	3100	U	6300	U	1400	U
Tetraethyldithiopyrophosphate	50	U	50	U	50	U	7600	U	15000	U	3500	U
1,2,4,5-Tetrachlorobenzene	10	U	10	U	10	U	1600	U	3100	U	720	U
2,3,4,6-Tetrachlorophenol	50	U	50	U	50	U	7600	U	15000	U	3500	U

GC/MS SEMIVOLATILES - DATA VALIDATION SUMMARY TABLES

Sample Number	OB-10		W4R		DUP-10		SOIL-6 (57.5-59)		SLG-6 (16-18)		SLG-6 (48-50)	
Lab Sample Number	A8F110143-001		A8F110143-002		A8F110143-003		A8F110143-005		A8F110143-006		A8F110143-007	
Matix	Water		Water		Water		Solid		Solid		Solid	
% Solids												
Analyte	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Units	ug/L		ug/L		ug/L		ug/Kg		ug/Kg		ug/Kg	
Thionazin	50	U	50	U	50	U	7600	U	15000	U	3500	U
o-Toluidine	20	U	20	U	20	U	3100	U	6300	U	1400	U
1,2,4-Trichlorobenzene	10	U	10	U	10	U	1600	U	3100	U	720	U
2,4,5-Trichlorophenol	10	U	10	U	10	U	1600	U	3100	U	720	U
2,4,6-Trichlorophenol	10	U	10	U	10	U	1600	U	3100	U	720	U
O,O,O-Triethylphosphorothioate	50	U	50	U	50	U	7600	U	15000	U	3500	U
1,3,5-Trinitrobenzene	50	U	50	U	50	U	7600	U	15000	U	3500	U

Sample Number	PRS-1		SLG-7(32-34)		SOIL-7(51.5-53)							
Lab Sample Number	A8F110143-008		A8F110143-010		A8F110143-013							
Matix	Solid		Solid		Solid							
Analyte	Result	Qual	Result	Qual	Result	Qual						
Units	ug/Kg		ug/Kg		ug/Kg							
Acenaphthene	7300	U	3800	U	1300	U						
Acenaphthylene	7300	U	3800	U	1300	U						
Acetophenone	7300	U	3800	U	1300	U						
2-Acetylaminofluorene	73000	U	38000	U	13000	U						
4-Aminobiphenyl	35000	U	18000	U	6400	U						
Aniline	7300	U	3800	U	1300	U						
Anthracene	7300	U	3800	U	1300	U						
Aramite	15000	U	7500	U	2600	U						
Benzo(a)anthracene	7300	U	3800	U	1300	U						
Benzo(a)pyrene	7300	U	3800	U	1300	U						
Benzo(b)fluoranthene	7300	U	3800	U	1300	U						
Benzo(ghi)perylene	7300	U	3800	U	1300	U						
Benzo(k)fluoranthene	7300	U	3800	U	1300	U						
Benzyl alcohol	7300	U	3800	U	1300	U						
4-Bromophenyl phenyl ether	7300	U	3800	U	1300	U						
Butyl benzyl phthalate	7300	U	3800	U	1300	U						
2-sec-Butyl-4,6-dinitrophenol	15000	U	7500	U	2600	U						
4-Chloroaniline	7300	U	3800	U	1300	U						
Chlorobenzilate	7300	U	3800	U	1300	U						
bis(2-Chloroethoxy)methane	7300	U	3800	U	1300	U						
bis(2-Chloroethyl)ether	7300	U	3800	U	1300	U						
bis(2-Chloro-1-methylethyl)ether	7300	U	3800	U	1300	U						
4-Chloro-2-methylphenol	7300	U	3800	U	1300	U						
2-Chloronaphthalene	7300	U	3800	U	1300	U						
2-Chlorophenol	7300	U	3800	U	1300	U						
4-Chlorophenyl phenyl ether	7300	U	3800	U	1300	U						
Chrysene	7300	U	3800	U	1300	U						
Diallate	15000	U	7500	U	2600	U						
Dibenz(a,h)anthracene	7300	U	3800	U	1300	U						

GC/MS SEMIVOLATILES - DATA VALIDATION SUMMARY TABLES

Sample Number	PRS-1		SLG-7(32-34)		SOIL-7(51.5-53)							
Lab Sample Number	A8F110143-008		A8F110143-010		A8F110143-013							
Matix	Solid		Solid		Solid							
Analyte	Result	Qual	Result	Qual	Result	Qual						
Units	ug/Kg		ug/Kg		ug/Kg							
Dibenzofuran	7300	U	3800	U	1300	U						
Di-n-butyl phthalate	7300	U	2300	J	1300	U						
1,2-Dichlorobenzene	7300	U	3800	U	1300	U						
1,3-Dichlorobenzene	7300	U	3800	U	1300	U						
1,4-Dichlorobenzene	7300	U	3800	U	1300	U						
3,3'-Dichlorobenzidine	35000	U	18000	U	6400	U						
2,4-Dichlorophenol	7300	U	3800	U	1300	U						
2,6-Dichlorophenol	7300	U	3800	U	1300	U						
Diethyl phthalate	7300	U	3800	U	1300	U						
Dimethoate	15000	U	7500	U	2600	U						
p-Dimethylaminoazobenzene	15000	U	7500	U	2600	U						
Disulfoton	35000	U	18000	U	6400	U						
7,12-Dimethylbenz(a)-anthracene	15000	U	7500	U	2600	U						
3,3'-Dimethylbenzidine	35000	U	18000	U	6400	U						
a,a-Dimethylphenethylamine	35000	U	18000	U	6400	U						
2,4-Dimethylphenol	7300	U	3800	U	1300	U						
Dimethyl phthalate	7300	U	3800	U	1300	U						
1,3-Dinitrobenzene	7300	U	3800	U	1300	U						
4,6-Dinitro-2-methylphenol	35000	U	18000	U	6400	U						
2,4-Dinitrophenol	35000	U	18000	U	6400	U						
2,4-Dinitrotoluene	7300	U	3800	U	1300	U						
2,6-Dinitrotoluene	7300	U	3800	U	1300	U						
Di-n-octyl phthalate	7300	U	3800	U	1300	U						
Diphenylamine	7300	U	3800	U	1300	U						
bis(2-Ethylhexyl)phthalate	2800	J	2400	J	1300	U						
Ethyl methanesulfonate	7300	U	3800	U	1300	U						
Famphur	73000	UJ	38000	UJ	13000	UJ						
Fluoranthene	7300	U	3800	U	1300	U						
Fluorene	7300	U	3800	U	1300	U						
Hexachlorobenzene	7300	U	3800	U	1300	U						

GC/MS SEMIVOLATILES - DATA VALIDATION SUMMARY TABLES

Sample Number	**PRS-1**		**SLG-7(32-34)**		**SOIL-7(51.5-53)**							
Lab Sample Number	A8F110143-008		A8F110143-010		A8F110143-013							
Matix	Solid		Solid		Solid							
Analyte	Result	Qual	Result	Qual	Result	Qual						
Units	ug/Kg		ug/Kg		ug/Kg							
Hexachlorobutadiene	7300	U	3800	U	1300	U						
Hexachlorocyclopentadiene	35000	U	18000	U	6400	U						
Hexachloroethane	7300	U	3800	U	1300	U						
Hexachloropropene	73000	U	38000	U	13000	U						
Indeno(1,2,3-cd)pyrene	7300	U	3800	U	1300	U						
Isophorone	7300	U	3800	U	1300	U						
Isosafrole	15000	U	7500	U	2600	U						
Methapyrilene	35000	U	18000	U	6400	U						
3-Methylcholanthrene	15000	U	7500	U	2600	U						
Methyl methanesulfonate	7300	U	3800	U	1300	U						
2-Methylnaphthalene	7300	U	2600	J	1300	U						
2-Methylphenol	7300	U	3100	J	1300	U						
3-Methylphenol	7300	U	16000	#	1300	U						
4-Methylphenol	7300	U	16000	#	1300	U						
Naphthalene	7300	U	3800	U	1300	U						
1,4-Naphthoquinone	35000	U	18000	U	6400	U						
1-Naphthylamine	7300	U	3800	U	1300	U						
1-2-Naphthylamine	7300	U	3800	U	1300	U						
2-Nitroaniline	35000	U	18000	U	6400	U						
3-Nitroaniline	35000	U	18000	U	6400	U						
4-Nitroaniline	35000	U	18000	U	6400	U						
Nitrobenzene	7300	U	3800	U	1300	U						
2-Nitrophenol	7300	U	3800	U	1300	U						
4-Nitrophenol	35000	U	18000	U	6400	U						
4-Nitroquinoline-1-oxide	73000	U	38000	U	13000	U						
N-Nitrosodi-n-butylamine	7300	U	3800	U	1300	U						
N-Nitrosodiethylamine	7300	U	3800	U	1300	U						
N-Nitrosodimethylamine	7300	U	3800	U	1300	U						

GC/MS SEMIVOLATILES - DATA VALIDATION SUMMARY TABLES

Sample Number	**PRS-1**		**SLG-7(32-34)**		**SOIL-7(51.5-53)**							
Lab Sample Number	A8F110143-008		A8F110143-010		A8F110143-013							
Matix	Solid		Solid		Solid							
Analyte	Result	Qual	Result	Qual	Result	Qual						
Units	ug/Kg		ug/Kg		ug/Kg							
N-Nitrosodiphenylamine	7300	U	3800	U	1300	U						
N-Nitrosodi-n-propylamine	7300	U	3800	U	1300	U						
N-Nitrosomethylethylamine	7300	U	3800	U	1300	U						
N-Nitrosomorpholine	7300	U	3800	U	1300	U						
N-Nitrosopyrrolidine	7300	U	3800	U	1300	U						
5-Nitro-o-toluidine	15000	U	7500	U	2600	U						
Pentachlorobenzene	7300	U	3800	U	1300	U						
Pentachloroethane	35000	U	18000	U	6400	U						
Pentachloronitrobenzene	35000	U	18000	U	6400	U						
Pentachlorophenol	7300	U	3800	U	1300	U						
Phenacetin	15000	U	7500	U	2600	U						
Phenanthrene	7300	U	3800	U	1300	U						
Phenol	7300	U	6800		480	J						
p-Phenylene diamine	73000	UJ	38000	UJ	13000	UJ						
Phorate	35000	U	18000	U	6400	U						
2-Picoline	15000	U	7500	U	2600	U						
Pronamide	15000	U	7500	U	2600	U						
Pyrene	7300	U	3800	U	1300	U						
Pyridine	15000	U	7500	U	2600	U						
Safrole	15000	U	7500	U	2600	U						
Tetraethyldithiopyrophosphate	35000	U	18000	U	6400	U						
1,2,4,5-Tetrachlorobenzene	7300	U	3800	U	1300	U						
2,3,4,6-Tetrachlorophenol	35000	U	18000	U	6400	U						
Thionazin	35000	U	18000	U	6400	U						
o-Toluidine	15000	U	7500	U	2600	U						

GC/MS SEMIVOLATILES - DATA VALIDATION SUMMARY TABLES

Sample Number	**PRS-1**		**SLG-7(32-34)**		**SOIL-7(51.5-53)**							
Lab Sample Number	A8F110143-008		A8F110143-010		A8F110143-013							
Matix	Solid		Solid		Solid							
Analyte	Result	Qual	Result	Qual	Result	Qual						
Units	ug/Kg		ug/Kg		ug/Kg							
1,2,4-Trichlorobenzene	7300	U	3800	U	1300	U						
2,4,5-Trichlorophenol	7300	U	3800	U	1300	U						
2,4,6-Trichlorophenol	7300	U	3800	U	1300	U						
O,O,O-Triethylphosphorothioate	35000	U	18000	U	6400	U						
1,3,5-Trinitrobenzene	35000	U	18000	U	6400	U						

GC/MS SEMIVOLATILES - DATA VALIDATION SUMMARY TABLES

Sample Number	SED-1		SED-2		SED-3		SED-4		DUP-11		DUP-22	
Lab Sample Number	A8F140101-001		A8F140101-002		A8F140101-003		A8F140101-004		A8F140101-005		A8F140101-007	
Matix	Solid		Solid		Solid		Solid		Solid		Solid	
Analyte	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Units	ug/Kg		ug/Kg		ug/Kg		ug/Kg		ug/Kg		ug/Kg	
Acenaphthene	500	U	680	U	480	U	1700	U	1700	U	910	U
Acenaphthylene	500	U	680	U	480	U	1700	U	1700	U	910	U
Acetophenone	500	U	680	U	480	U	1700	U	1700	U	430	J
2-Acetylaminofluorene	5000	U	6800	U	4800	U	17000	U	17000	U	9100	U
4-Aminobiphenyl	2400	U	3300	U	2400	U	8500	U	8500	U	4400	U
Aniline	500	U	680	U	480	U	1700	U	1700	U	910	U
Anthracene	500	U	680	U	480	U	1700	U	1700	U	910	U
Aramite	1000	U	1400	U	970	U	3500	U	3500	U	1800	U
Benzo(a)anthracene	500	U	680	U	480	U	1700	U	1700	U	910	U
Benzo(a)pyrene	500	U	680	U	480	U	1700	U	1700	U	910	U
Benzo(b)fluoranthene	500	U	680	U	480	U	1700	U	1700	U	910	U
Benzo(ghi)perylene	500	U	680	U	480	U	1700	U	1700	U	910	U
Benzo(k)fluoranthene	500	U	680	U	480	U	1700	U	1700	U	910	U
Benzyl alcohol	500	U	680	U	480	U	1700	U	1700	U	910	U
4-Bromophenyl phenyl ether	500	U	680	U	480	U	1700	U	1700	U	910	U
Butyl benzyl phthalate	500	U	380	U	480	U	1700	U	1700	U	910	U
2-sec-Butyl-4,6-dinitrophenol	1000	U	1400	U	970	U	3500	U	3500	U	1800	U
4-Chloroaniline	500	U	680	U	480	U	1700	U	1700	U	910	U
Chlorobenzilate	500	U	680	U	480	U	1700	U	1700	U	910	U
bis(2-Chloroethoxy)methane	500	U	680	U	480	U	1700	U	1700	U	910	U
bis(2-Chloroethyl)ether	500	U	680	U	480	U	1700	U	1700	U	910	U
bis(2-Chloro-1-methylethyl)ether	500	U	680	U	480	U	1700	U	1700	U	910	U
4-Chloro-2-methylphenol	500	U	680	U	480	U	1700	U	1700	U	910	U
2-Chloronaphthalene	500	U	680	U	480	U	1700	U	1700	U	910	U
2-Chlorophenol	500	U	680	U	480	U	1700	U	1700	U	910	U
4-Chlorophenyl phenyl ether	500	U	680	U	480	U	1700	U	1700	U	910	U
Chrysene	500	U	680	U	480	U	1700	U	1700	U	910	U
Diallate	1000	U	1400	U	970	U	3500	U	3500	U	1800	U

GC/MS SEMIVOLATILES - DATA VALIDATION SUMMARY TABLES

Sample Number	SED-1		SED-2		SED-3		SED-4		DUP-11		DUP-22	
Lab Sample Number	A8F140101-001		A8F140101-002		A8F140101-003		A8F140101-004		A8F140101-005		A8F140101-007	
Matix	Solid		Solid		Solid		Solid		Solid		Solid	
Analyte	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Units	ug/Kg		ug/Kg		ug/Kg		ug/Kg		ug/Kg		ug/Kg	
Dibenz(a,h)anthracene	500	U	680	U	480	U	1700	U	1700	U	910	U
Dibenzofuran	500	U	680	U	480	U	1700	U	1700	U	910	U
Di-n-butyl phthalate	500	U	680	U	480	U	1700	U	1700	U	910	U
1,2-Dichlorobenzene	500	U	680	U	480	U	1700	U	1700	U	910	U
1,3-Dichlorobenzene	500	U	680	U	480	U	1700	U	1700	U	910	U
1,4-Dichlorobenzene	500	U	680	U	480	U	1700	U	1700	U	910	U
3,3'-Dichlorobenzidine	2400	U	3300	U	2400	U	8500	U	8500	U	4400	U
2,4-Dichlorophenol	500	U	680	U	480	U	1700	U	1700	U	910	U
2,6-Dichlorophenol	500	U	680	U	480	U	1700	U	1700	U	910	U
Diethyl phthalate	500	U	680	U	480	U	1700	U	1700	U	910	U
Dimethoate	1000	U	1400	U	970	U	3500	U	3500	U	1800	U
p-Dimethylaminoazobenzene	1000	U	1400	U	970	U	3500	U	3500	U	1800	U
Disulfoton	2400	U	3300	U	2400	U	8500	U	8500	U	4400	U
7,12-Dimethylbenz(a)-anthracene	1000	U	1400	U	970	U	3500	U	3500	U	1800	U
3,3'-Dimethylbenzidine	2400	U	3300	U	2400	U	8500	U	8500	U	4400	U
a,a-Dimethylphenethylamine	2400	UJ	3300	U	2400	U	8500	U	8500	U	4400	U
2,4-Dimethylphenol	500	U	680	U	480	U	1700	U	1700	U	910	U
Dimethyl phthalate	500	U	680	U	480	U	1700	U	1700	U	910	U
1,3-Dinitrobenzene	500	U	680	U	480	U	1700	U	1700	U	910	U
4,6-Dinitro-2-methylphenol	2400	U	3300	U	2400	U	8500	U	8500	U	4400	U
2,4-Dinitrophenol	2400	U	3300	U	2400	U	8500	U	8500	U	4400	U
2,4-Dinitrotoluene	500	U	680	U	480	U	1700	U	1700	U	910	U
2,6-Dinitrotoluene	500	U	680	U	480	U	1700	U	1700	U	910	U
Di-n-octyl phthalate	500	U	680	U	480	U	1700	U	1700	U	910	U
Diphenylamine	500	U	680	U	480	U	1700	U	1700	U	910	U
bis(2-Ethylhexyl)phthalate	500	U	680	U	480	U	1700	U	1700	U	590	J
Ethyl methanesulfonate	500	U	680	U	480	U	1700	U	1700	U	910	U
Famphur	5000	UJ	6800	UJ	4800	UJ	17000	UJ	17000	UJ	9100	UJ
Fluoranthene	500	U	680	U	480	U	1700	U	1700	U	910	U
Fluorene	500	U	680	U	480	U	1700	U	1700	U	910	U

GC/MS SEMIVOLATILES - DATA VALIDATION SUMMARY TABLES

Sample Number	SED-1		SED-2		SED-3		SED-4		DUP-11		DUP-22	
Lab Sample Number	A8F140101-001		A8F140101-002		A8F140101-003		A8F140101-004		A8F140101-005		A8F140101-007	
Matix	Solid		Solid		Solid		Solid		Solid		Solid	
Analyte	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Units	ug/Kg		ug/Kg		ug/Kg		ug/Kg		ug/Kg		ug/Kg	
Hexachlorobenzene	500	U	680	U	480	U	1700	U	1700	U	910	U
Hexachlorobutadiene	500	U	680	U	480	U	1700	U	1700	U	910	U
Hexachlorocyclopentadiene	2400	U	3300	UJ	2400	UJ	8500	UJ	8500	UJ	4400	UJ
Hexachloroethane	500	U	680	U	480	U	1700	U	1700	U	910	U
Hexachloropropene	5000	U	6800	U	4800	U	17000	U	17000	U	9100	U
IndenO(1,2,3-cd)pyrene	500	U	680	U	480	U	1700	U	1700	U	910	U
Isophorone	500	U	680	U	480	U	1700	U	1700	U	910	U
Isosafrole	1000	U	1400	U	970	U	3500	U	3500	U	1800	U
Methapyrilene	2400	U	3300	U	2400	U	8500	U	8500	U	4400	U
3-Methylcholanthrene	1000	U	1400	U	970	U	3500	U	3500	U	1800	U
Methyl methanesulfonate	500	U	680	U	480	U	1700	U	1700	U	910	U
2-Methylnaphthalene	500	U	680	U	480	U	1700	U	1700	U	510	J
2-Methylphenol	500	U	680	U	480	U	1700	U	1700	U	910	U
3-Methylphenol	500	U	680	U	480	U	1700	U	1700	U	3200	#
4-Methylphenol	500	U	680	U	480	U	1700	U	1700	U	3200	#
Naphthalene	500	U	680	U	480	U	1700	U	1700	U	910	U
1,4-Naphthoquinone	2400	U	3300	U	2400	U	8500	U	8500	U	4400	U
1-Naphthylamine	500	U	680	U	480	U	1700	U	1700	U	910	U
1-2-Naphthylamine	500	U	680	U	480	U	1700	U	1700	U	910	U
2-Nitroaniline	2400	U	3300	U	2400	U	8500	U	8500	U	4400	U
3-Nitroaniline	2400	U	3300	U	2400	U	8500	U	8500	U	4400	U
4-Nitroaniline	2400	U	3300	U	2400	U	8500	U	8500	U	4400	U
Nitrobenzene	500	U	680	U	480	U	1700	U	1700	U	910	U
2-Nitrophenol	500	U	680	U	480	U	1700	U	1700	U	910	U
4-Nitrophenol	2400	U	3300	U	2400	U	8500	U	8500	U	4400	U
4-Nitroquinoline-1-oxide	5000	U	6800	UJ	4800	UJ	17000	UJ	17000	UJ	9100	UJ
N-Nitrosodi-n-butylamine	500	U	680	U	480	U	1700	U	1700	U	910	U
N-Nitrosodiethylamine	500	U	680	U	480	U	1700	U	1700	U	910	U
N-Nitrosodimethylamine	500	U	680	U	480	U	1700	U	1700	U	910	U

GC/MS SEMIVOLATILES - DATA VALIDATION SUMMARY TABLES

Sample Number	SED-1		SED-2		SED-3		SED-4		DUP-11		DUP-22	
Lab Sample Number	A8F140101-001		A8F140101-002		A8F140101-003		A8F140101-004		A8F140101-005		A8F140101-007	
Matix	Solid		Solid		Solid		Solid		Solid		Solid	
Analyte	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Units	ug/Kg		ug/Kg		ug/Kg		ug/Kg		ug/Kg		ug/Kg	
N-Nitrosodiphenylamine	500	U	680	U	480	U	1700	U	1700	U	910	U
N-Nitrosodi-n-propylamine	500	U	680	U	480	U	1700	U	1700	U	910	U
N-Nitrosomethylethylamine	500	U	680	U	480	U	1700	U	1700	U	910	U
N-Nitrosomorpholine	500	U	680	U	480	U	1700	U	1700	U	910	U
N-Nitrosopyrrolidine	500	U	680	U	480	U	1700	U	1700	U	910	U
5-Nitro-o-toluidine	1000	U	1400	U	970	U	3500	U	3500	U	1800	U
Pentachlorobenzene	500	U	680	U	480	U	1700	U	1700	U	910	U
Pentachloroethane	2400	U	3300	U	2400	U	8500	U	8500	U	4400	U
Pentachloronitrobenzene	2400	U	3300	U	2400	U	8500	U	8500	U	4400	U
Pentachlorophenol	500	U	680	U	480	U	1700	U	1700	U	910	U
Phenacetin	1000	U	1400	U	970	U	3500	U	3500	U	1800	U
Phenanthrene	500	U	680	U	480	U	1700	U	1700	U	910	U
Phenol	500	U	680	U	480	U	1700	U	1700	U	3000	
p-Phenylene diamine	5000	UJ	6800	UJ	4800	UJ	17000	UJ	17000	UJ	9100	UJ
Phorate	2400	U	3300	U	2400	U	8500	U	8500	U	4400	U
2-Picoline	1000	U	1400	U	970	U	3500	U	3500	U	1800	U
Pronamide	1000	U	1400	U	970	U	3500	U	3500	U	1800	U
Pyrene	500	U	680	U	480	U	1700	U	1700	U	910	U
Pyridine	1000	U	1400	U	970	U	3500	U	3500	U	1800	U
Safrole	1000	U	1400	U	970	U	3500	U	3500	U	1800	U
Tetraethyldithiopyrophosphate	2400	U	3300	U	2400	U	8500	U	8500	U	4400	U
1,2,4,5-Tetrachlorobenzene	500	U	680	U	480	U	1700	U	1700	U	910	U
2,3,4,6-Tetrachlorophenol	2400	U	3300	U	2400	U	8500	U	8500	U	4400	U
Thionazin	2400	U	3300	U	2400	U	8500	U	8500	U	4400	U
o-Toluidine	1000	U	1400	U	970	U	3500	U	3500	U	1800	U

GC/MS SEMIVOLATILES - DATA VALIDATION SUMMARY TABLES

Sample Number	SED-1		SED-2		SED-3		SED-4		DUP-11		DUP-22	
Lab Sample Number	A8F140101-001		A8F140101-002		A8F140101-003		A8F140101-004		A8F140101-005		A8F140101-007	
Matix	Solid		Solid		Solid		Solid		Solid		Solid	
Analyte	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Units	ug/Kg		ug/Kg		ug/Kg		ug/Kg		ug/Kg		ug/Kg	
1,2,4-Trichlorobenzene	500	U	680	U	480	U	1700	U	1700	U	910	U
2,4,5-Trichlorophenol	500	U	680	U	480	U	1700	U	1700	U	910	U
2,4,6-Trichlorophenol	500	U	680	U	480	U	1700	U	1700	U	910	U
O,O,O-Triethylphosphorothioate	2400	U	3300	U	2400	U	8500	U	8500	U	4400	U
1,3,5-Trinitrobenzene	2400	U	3300	U	2400	U	8500	U	8500	U	4400	U

POLYCHLORINATED BIPHENYLS - DATA VALIDATION SUMMARY TABLES

Sample Number	SLG-8 (31-33)		SLG-8 (47-49)		SLG-8 (51-53)		SOIL-9 (38-40)		SLG-9 (24-26)		SLG-9 (34-36)		SOIL-8 (57-58)		SLG-9 (32-34)	
Lab Sample Number	A8F140101-009		A8F140101-010		A8F140101-011		A8F140101-012		A8F140101-013		A8F140101-014		A8F140101-007		A8F140101-027	
Matix	Solid		Solid		Solid		Solid		Solid		Solid		Solid		Solid	
Analyte	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Units	ug/Kg		ug/Kg		ug/Kg		ug/Kg		ug/Kg		ug/Kg		ug/Kg		ug/Kg	
Aroclor 1016	70	U	71	U	76	U	38	U	96	U	87	U	48	U	75	U
Aroclor 1221	70	U	71	U	76	U	38	U	96	U	87	U	48	U	75	U
Aroclor 1232	70	U	71	U	76	U	38	U	96	U	87	U	48	U	75	U
Aroclor 1242	70	U	71	U	76	U	38	U	1300		590		48	U	320	
Aroclor 1248	70	U	71	U	76	U	38	U	96	U	87	U	48	U	75	U
Aroclor 1254	70	U	71	U	76	U	38	U	96	U	87	U	48	U	75	U
Aroclor 1260	70	U	71	U	76	U	38	U	96	U	87	U	48	U	75	U

POLYCHLORINATED BIPHENYLS - DATA VALIDATION SUMMARY TABLES

Sample Number	SED-1		SED-2		SED-3		SED-4		DUP-11		DUP-21		PRS-1	
Lab Sample Number	A8F140101-001		A8F140101-002		A8F140101-003		A8F140101-004		A8F140101-005		A8F140101-006		A8F110143-008	
Matix	Solid		Solid		Solid		Solid		Solid		Solid		Solid	
Analyte	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Units	ug/Kg		ug/Kg		ug/Kg		ug/Kg		ug/Kg		ug/Kg		ug/Kg	
Aroclor 1016	50	U	68	U	48	U	170	U	170	U	79	U	73	U
Aroclor 1221	50	U	68	U	48	U	170	U	170	U	79	U	73	U
Aroclor 1232	50	U	68	U	48	U	170	U	170	U	79	U	73	U
Aroclor 1242	50	U	68	U	48	U	170	U	170	U	79	U	73	U
Aroclor 1248	50	U	68	U	48	U	170	U	170	U	79	U	73	U
Aroclor 1254	50	U	68	U	48	U	170	U	170	U	79	U	73	U
Aroclor 1260	50	U	68	U	48	U	170	U	170	U	79	U	73	U

POLYCHLORINATED BIPHENYLS - DATA VALIDATION SUMMARY TABLES

Sample Number	**OB-10**		**W4R**		**DUP-10**		**SOIL-6 (57.5-59)**		**SOIL-6 (16-18)**		**SLG-6 (48-50)**		**SLG-6 (38-40)**		**SOIL-6 (38-40) TOP**	
Lab Sample Number	A8F110143-001		A8F110143-002		A8F110143-003		A8F110143-005		A8F110143-006		A8F110143-007		A8F110143-009		A8F110143-014	
Matix	Water		Water		Water		Solid		Solid		Solid		Solid		Solid	
Analyte	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Units	ug/L		ug/L		ug/L		ug/Kg		ug/Kg		ug/Kg		ug/Kg		ug/Kg	
Aroclor 1016	1.0	U	1.0	U	1.0	U	39	U	78	U	72	U	74	UJ	1.0	U
Aroclor 1221	1.0	U	1.0	U	1.0	U	39	U	78	U	72	U	74	UJ	1.0	U
Aroclor 1232	1.0	U	1.0	U	1.0	U	39	U	78	U	72	U	74	UJ	1.0	U
Aroclor 1242	1.0	U	1.0	U	1.0	U	240		78	U	120		74	UJ	1.0	U
Aroclor 1248	1.0	U	1.0	U	1.0	U	39	U	78	U	72	U	74	UJ	1.0	U
Aroclor 1254	1.0	U	1.0	U	1.0	U	39	U	78	U	72	U	74	UJ	1.0	U
Aroclor 1260	1.0	U	1.0	U	1.0	U	39	U	78	U	72	U	74	UJ	1.0	U

POLYCHLORINATED BIPHENYLS - DATA VALIDATION SUMMARY TABLES

Sample Number	SLG-7 (32-34)		SLG-7 (38-40)		SLG-7 (48-50)		SOIL-7 (51.5-53)							
Lab Sample Number	A8F110143-010		A8F110143-011		A8F110143-012		A8F110143-013							
Matix	Solid		Solid		Solid		Solid							
Analyte	Result	Qual	Result	Qual	Result	Qual	Result	Qual						
Units	ug/Kg		ug/Kg		ug/Kg		ug/Kg							
Aroclor 1016	75	U	70	U	83	U	53	U						
Aroclor 1221	75	U	70	U	83	U	53	U						
Aroclor 1232	75	U	70	U	83	U	53	U						
Aroclor 1242	75	U	200		83	U	53	U						
Aroclor 1248	75	U	70	U	83	U	53	U						
Aroclor 1254	75	U	70	U	83	U	53	U						
Aroclor 1260	75	U	70	U	83	U	53	U						

POLYCHLORINATED BIPHENYLS - DATA VALIDATION SUMMARY TABLES

Sample Number	**EB-2**		**EB-3**		**OB-14**		**SR-1**							
Lab Sample Number	A8F140101-016		A8F140101-017		A8F140101-018		A8F140101-019							
Matix	Water		Water		Water		Water							
Analyte	Result	Qual	Result	Qual	Result	Qual	Result	Qual						
Units	ug/L		ug/L		ug/L		ug/L							
Aroclor 1016	1.0	U	1.0	U	1.0	U	1.0	U						
Aroclor 1221	1.0	U	1.0	U	1.0	U	1.0	U						
Aroclor 1232	1.0	U	1.0	U	1.0	U	1.0	U						
Aroclor 1242	1.0	U	1.0	U	1.0	U	1.0	U						
Aroclor 1248	1.0	U	1.0	U	1.0	U	1.0	U						
Aroclor 1254	1.0	U	1.0	U	1.0	U	1.0	U						
Aroclor 1260	1.0	U	1.0	U	1.0	U	1.0	U						

TOTAL METALS-DATA VALIDATION SUMMARY TABLES

Sample Number	SED-1		SED-2		SED-3		SED-4		DUP-11		DUP-21		DUP-22		SOIL-8 (57-59)	
Lab Sample Number	A8F140101-001		A8F140101-002		A8F140101-003		A8F140101-004		A8F140101-005		A8F140101-006		A8F140101-007		A8F140101-008	
Matix	Solid		Solid		Solid		Solid		Solid		Solid		Solid		Solid	
% Soilds	65.6		48.8		68.1		18.9		18.9		41.6		36.1		69.3	
Analyte	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Units	mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg	
Antimony	9.2	U	12.3	U	8.8	U	31.7	U	31.7	U	14.4	U	16.6	U	8.7	U
Arsenic	0.82		0.99		0.87		2.1		1.3		2.4		1.1		1.0	
Barium	18.7		51.5		15.5		112		105		102		117		17.3	
Beryllium	0.76	U	0.29		0.73	U	0.51		0.46		0.28		1.4	U	0.72	U
Cadmium	0.76	U	1.0	U	0.73	U	2.6	U	2.6	U	1.2	U	1.4	U	0.72	U
Chromium	1.4		8.1		4.4		9.7		10.1		28.1		72.1		8.2	
Cobalt	7.6	U	10.3	U	7.3	U	26.5	U	26.5	U	1.8		13.9	U	1.4	
Copper	1.5		4.5		1.2		14.7		9.4		94.2		78.5		12.4	
Lead	5.8		13.5		3.6		13.1		10.9		92.6		328		17.7	
Mercury	0.15	U	0.12		0.15	U	0.25		0.19		0.24	U	0.057		0.14	U
Nickel	6.1	U	3.5		5.9	U	6.2		21.2	U	6.4		3.5		3.4	
Selenium	0.76	U	1.0	U	0.73	U	2.6	U	2.6	U	1.2	U	1.4	U	0.72	U
Silver	1.5	U	2.1	U	1.5	U	5.3	U	5.3	U	2.4	U	2.8	U	1.4	U
Thallium	1.5	U	2.1	U	1.5	U	5.3	U	5.3	U	2.4	U	2.8	U	1.4	U
Vanadium	2.0		9.5		7.3		7.8		10.0		15.7		13.4		8.3	
Zinc	36.9		15.1		8.2		39.8		39.5		135		162		16.7	
Tin	2.8		20.5	U	2.5		12.2		52.9	U	5.5		3.4		1.9	
Titanium	34.5		118		210		121		147		122		109		208	

TOTAL METALS-DATA VALIDATION SUMMARY TABLES

Sample Number	SLG-8 (31-33)		SLG-8 (51-53)		SOIL-9 (38-40)		SLG-9 (24-26)		SLG-9 (34-36)		EB-1		EB-2		EB-3	
Lab Sample Number	A8F140101-009		A8F140101-011		A8F140101-012		A8F140101-013		A8F140101-014		A8F140101-015		A8F140101-016		A8F140101-017	
Matrix	Solid		Solid		Solid		Solid		Solid		Liquid		Liquid		Liquid	
% Soilds	47.2		43.6		87.0		34.5		37.9							
Analyte	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Units	mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/L		mg/L		mg/L	
Antimony	12.7	U	13.8	U	6.9	U	17.4	U	15.9	U	0.060	U	0.060	U	0.060	U
Arsenic	4.9		1.5		1.8		0.87		0.76		0.010	U	0.010	U	0.010	U
Barium	48.5		107		17.9		94.5		140		0.20	U	0.20	U	0.20	U
Beryllium	0.64		0.26		0.57	U	1.4	U	1.3	U	0.00067		0.0050	U	0.0050	U
Cadmium	1.1	U	1.1	U	0.57	U	1.4	U	1.3	U	0.0050	U	0.0050	U	0.0050	U
Chromium	6.5		26.1		6.3		22.2		104		0.010	U	0.010	U	0.010	U
Cobalt	2.4		1.7		1.8		14.5	U	13.2	U	0.0050	U	0.050	U	0.050	U
Copper	28.9		94.5		4.6		68.1		85.0		0.025	U	0.025	U	0.025	U
Lead	3.2		101		2.7		80.8		469		0.0030	U	0.0030	U	0.0030	U
Mercury	0.21	U	0.23	U	0.11	UJ	0.29	U	0.26	U	.000084		.000079		.000092	
Nickel	6.3		5.1		3.4		11.6	U	3.4		0.040	U	0.040	U	0.040	U
Selenium	1.1	U	1.1	U	0.57	U	1.4	U	1.3	U	0.0050	U	0.0050	U	0.0050	U
Silver	2.1	U	2.3	U	1.1	U	2.9	U	2.6	U	0.010	U	0.010	U	0.010	U
Thallium	2.1	U	2.3	U	1.1	U	2.9	U	2.6	U	0.010	U	0.010	U	0.010	U
Vanadium	11.6		13.2		8.5		12.0		12.6		0.050	U	0.050	U	0.050	U
Zinc	34.6		116		14.1		130		195		0.024		0.031		0.046	
Tin	3.0		6.0		4.1		29.0	U	26.4	U	0.10	U	0.10	U	0.10	U
Titanium	205		103		176		89.2		106		0.050	U	0.050	U	0.050	U

TOTAL METALS-DATA VALIDATION SUMMARY TABLES

Sample Number	**OB-14**		**SR-1**		**SW-1**		**SW-2**		**SW-3**		**SW-4**		**DUP-11**	
Lab Sample Number	A8F140101-018		A8F140101-019		A8F140101-020		A8F140101-021		A8F140101-022		A8F140101-023		A8F140101-024	
Matrix	Liquid		Liquid		Liquid		Liquid		Liquid		Liquid		Liquid	
Analyte	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Units	mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L	
Antimony	0.060	U	0.060	U	0.060	U	0.060	U	0.060	U	0.060	U	0.060	U
Arsenic	0.0052		0.010	U	0.010	U	0.0033		0.010	U	0.010	U	0.010	U
Barium	0.055		0.028		0.10		0.080		0.12		1.2		1.1	
Beryllium	.00071		0.0050	U	0.0050	U	0.0050	U	0.00068		0.00076		0.00083	
Cadmium	0.0050	U	0.0050	U	0.0050	U	0.0050	U	0.0050	U	0.0050	U	0.0050	U
Chromium	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U
Cobalt	0.050	U	0.050	U	0.050	U	0.050	U	0.050	U	0.050	U	0.050	U
Copper	0.025	U	0.025	U	0.025	U	0.0054		0.025	U	0.0091		0.0088	
Lead	0.0030	U	0.0030	U	0.0030	U	0.0024		0.0030	U	0.0030	U	0.0030	U
Mercury	.00020	U	0.073		.00020	U	.000086		.000084		.000076		.00010	
Nickel	0.040	U	0.040	U	0.040	U	0.040	U	0.029		0.040	U	0.040	U
Selenium	0.0050	U	0.0050	U	0.0050	U	0.0050	U	0.0050	U	0.0050	U	0.0050	U
Silver	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U
Thallium	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U
Vanadium	0.0096		0.050	U	0.050	U	0.050	U	0.050	U	0.050	U	0.050	U
Zinc	0.068		0.022		0.036		0.074		0.021		0.063		0.082	
Tin	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U
Titanium	0.050	U	0.050	U	0.050	U	0.050	U	0.050	U	0.050	U	0.050	U

TOTAL METALS-DATA VALIDATION SUMMARY TABLES

Sample Number	OB-10		W4R		DUP-10		SOIL-6 (57.5-59)		SLG-6 (16-18)		SLG-6 (48-50)		PRS-1	
Lab Sample Number	A8F110143-001		A8F110143-002		A8F110143-003		A8F110143-005		A8F110143-006		A8F110143-007		A8F110143-008	
Matix	Water		Water		Water		Solid		Solid		Solid		Solid	
% Soilds							84.4		42.2		45.6		45.3	
Analyte	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Units	mg/L		mg/L		mg/L		mg/Kg		mg/Kg		mg/Kg		mg/Kg	
Antimony	0.060	U	0.060	U	0.060	U	7.1	U	14.2	U	13.2	U	13.2	U
Arsenic	0.010	U	0.010	U	0.010	U	1.1		1.3		8.0		0.94	
Barium	0.036		0.029		0.029		17.6		51.3		101		34.7	
Beryllium	0.0050	U	0.0050	U	0.0050	U	0.59	U	1.2	U	0.28		1.1	U
Cadmium	0.0050	U	0.0050	U	0.0050	U	0.59	U	1.2	U	1.1	U	1.1	U
Chromium	0.010	U	0.010	U	0.010	U	5.8		17.3		27.8		5.4	
Cobalt	0.050	U	0.050	U	0.050	U	1.2		1.4		3.6		11.0	U
Copper	0.0062		0.025	U	0.025	U	6.7		110		76.8		182	
Lead	0.0030	U	0.0030	U	0.0030	U	6.6		10.9		62.1		3.5	
Mercury	.00020	U	.000078		.000075		0.042		0.057		0.099		0.22	U
Nickel	0.040	U	0.040	U	0.040	U	2.7		5.4		11.7		8.8	U
Selenium	0.0050	U	0.0040		0.0050	U	0.59	U	1.6		1.1	U	1.1	U
Silver	0.010	U	0.010	U	0.010	U	1.2	U	2.4	U	2.2	U	2.2	U
Thallium	0.010	U	0.010	U	0.010	U	1.2	U	2.4	U	2.2	U	2.2	U
Vanadium	0.050	U	0.050	U	0.050	U	6.0		18.4		15.0		6.7	
Zinc	0.025		0.016		0.016		19.8		95.4		215		132	
Tin	0.10	U	0.10	U	0.10	U	3.1		6.8		4.8		22.1	U
Titanium	0.050	U	0.050	U	0.050	U	97.0		143		208		75.5	

TOTAL METALS-DATA VALIDATION SUMMARY TABLES

Sample Number	**SLG-7 (32-34)**		**SLG-7 (48-50)**		**SOIL-7 (51.5-53)**									
Lab Sample Number	A8F110143-010		A8F110143-012		A8F110143-013									
Matix	Solid		Solid		Solid									
% Soilds	43.8		39.5		62.6									
Analyte	Result	Qual	Result	Qual	Result	Qual								
Units	mg/Kg		mg/Kg		mg/Kg									
Antimony	13.7	U	15.2	U	9.6	U								
Arsenic	0.59		2.2		1.3									
Barium	76.8		96.7		39.7									
Beryllium	1.1	U	1.3	U	0.80	U								
Cadmium	1.1	U	1.3	U	0.80	U								
Chromium	9.9		32.1		10.9									
Cobalt	11.4	U	12.6	U	1.3									
Copper	67.9		65.2		8.8									
Lead	16.4		115		7.9									
Mercury	0.23	U	0.25	U	0.087									
Nickel	9.1	U	5.3		5.1									
Selenium	1.1	U	1.3	U	1.5									
Silver	2.3	U	2.5	U	1.6	U								
Thallium	2.3	U	2.5	U	1.6	U								
Vanadium	12.3		12.5		15.1									
Zinc	110		107		19.5									
Tin	2.8		3.0		2.2									
Titanium	160		189		154									

TCLP METALS- DATA VALIDATION SUMMARY TABLES

Sample Number	SLG-8 (31-33)		SLG-8 (51-53)		SOIL-9 (38-40)		SLG-9 (24-26)		SLG-9 (34-36)							
Lab Sample Number	A8F140101-009		A8F140101-011		A8F140101-012		A8F140101-013		A8F140101-014							
Matix	Solid		Solid		Solid		Solid		Solid							
Analyte	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual						
Units	mg/L		mg/L		mg/L		mg/L		mg/L							
Arsenic	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U						
Barium	0.31		0.90		0.35		0.61		0.95							
Cadmium	0.0037		0.10	U	0.10	U	0.10	U	0.10	U						
Chromium	0.0084		0.50	U	0.50	U	0.50	U	0.50	U						
Lead	0.50	U	0.50	U	0.50	U	0.059		0.32							
Selenium	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U						
Silver	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U						
Mercury	0.0020	U	0.0020	U	0.0020	U	0.0020	U	0.0020	U						

TCLP METALS- DATA VALIDATION SUMMARY TABLES

Sample Number	**SLG-6 (16-18)**		**SLG-6 (48-50)**		**PRS-1**		**SLG-7 (32-34)**		**SLG-7 (48-50)**					
Lab Sample Number	A8F110143-006		A8F110143-007		A8F110143-008		A8F110143-010		A8F110143-012					
Matix	Solid		Solid		Solid		Solid		Solid					
% Soilds														
Analyte	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual				
Units	mg/L		mg/L		mg/L		mg/L		mg/L					
Arsenic	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U				
Barium	0.28		0.68		0.26		0.83		0.79					
Cadmium	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U				
Chromium	0.012		0.0070		0.50	U	0.50	U	0.014					
Lead	0.50	U	0.50	U	0.50	U	0.50	U	0.15					
Selenium	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U				
Silver	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U				
Mercury	0.0020	U	.000083		0.0020	U	0.0020	U	.000074					

GENERAL CHEMISTRY - DATA VALIDATION SUMMARY TABLES

Sample Number	**OB-10**		**W4R**		**DUP-10**		**EB-1**		**OB-14**		**SR-1**			
Lab Sample Number	A8F110143-001		A8F110143-002		A8F110143-003		A8F14101-015		A8F14101-018		A8F14101-019			
Matix	Water		Water		Water		Water		Water		Water			
% Soilds														
Analyte	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual		
Units	mg/L		mg/L		mg/L		mg/L		mg/L		mg/L			
Nitrate	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U		
Nitrite	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U		
Total Sulfide	1.6	J	1.4	J	1.4	J	1.4	J	0.93	J	1.2	J		

MANISTIQUE PAPERS, INC. - RESIDUALS MANAGEMENT AREA
EPA ID NO. MID981192628

SITE SPECIFIC SAMPLING AND ANALYSIS PLAN
WASTE, SOIL, SURFACE WATER, SEDIMENT
AND GROUNDWATER SAMPLING

TASK 05 DELIVERABLE

Submitted to:

Mr. Brian Freeman
U.S. Environmental Protection Agency
Region 5 DE-9J
77 West Jackson Boulevard
Chicago, Illinois 60604

Submitted By:

TechLaw, Inc.
20 North Wacker Drive, Suite 1260
Chicago, Illinois 60606

EPA Work Assignment No.	**R05020**
Contract Number	**68-W4-0006**
TechLaw WAM	**Patricia Brown-Derocher**
Telephone No.	**312/345-8963**
EPA WAM	**Brian Freeman**
Telephone No.	**312/353-2720**

June 8, 1998

MANISTIQUE PAPERS, INC. - RESIDUALS MANAGEMENT AREA
EPA ID NO. MID981192628

SITE SPECIFIC SAMPLING AND ANALYSIS PLAN
WASTE, SOIL, SURFACE WATER, SEDIMENT
AND GROUNDWATER SAMPLING

The following constitutes the Site-Specific Field Sampling and Analysis Plan (SAP) for the waste, soil, surface water, sediment and groundwater sampling to be performed at the Manistique Papers, Inc. (Manistique Papers) Residuals Management Area (RMA) in Hiawatha, Michigan. This SAP also details the anticipated sampling and analyses proposed at the Manistique Papers paper mill located in Manistique, Michigan. The sampling activities will be initiated on June 9, 1998 and are expected to continue for two to three days. Sampling activities will take place using two, two-person sampling teams. The schedule outlined in this SAP may change due to the variables (e.g., weather, equipment related delays) associated with field sampling work.

This SAP will be used in conjunction with TechLaw's U.S. Environmental Protection Agency (U.S. EPA)-approved Region 5 Generic Quality Assurance Project Plan (QAPP) for Sampling Operations, dated January 1995. TechLaw has selected Quanterra Environmental Services (Quanterra) in North Canton, Ohio to perform the analyses required under this SAP.

Purpose and Objective

This SAP has been prepared to allow for the collection and analysis of waste, soil, surface water, sediment and groundwater samples from the RMA. The samples will be collected to assist U.S. EPA Region 5 in determining whether the waste pile at the RMA contains hazardous waste or hazardous constituents, including polychlorinated biphenyls (PCBs), and whether these hazardous constituents have potentially impacted biological receptors, including wetlands and surrounding surface water bodies. Tables 1 and 2 of this SAP present information which identifies the number of samples, sampling intervals, field and laboratory parameters, analytical methods, recommended sample containers, matrices, holding times, and preservatives for this sampling activity. In addition to the sample collection activities that are conducted, information will be gathered to assist U.S. EPA with the delineation of wetlands in the area surrounding the RMA.

Background Information

Manistique Papers generates residuals during their milling process which uses recycled paper and various additives to make a variety of paper products. Since 1973, Manistique Papers has disposed of mill process residuals in their RMA which is located about one and one-half miles north of the City of Manistique. Of the 480 acres that are owned by Manistique Papers in the area surrounding the RMA, 230 acres are considered, by Manistique Papers, as suitable for the disposal of plant residuals. Approximately 45 acres of this 230 acres is considered under active use according to a January 1988 Hydrogeological Study (prepared by Bittner Engineering, Inc.). Residuals are transported by truck to the RMA and dumped onto the waste pile. The waste pile is unlined, unengineered, and operated as an above ground site. Based on 1997 aerial photography, the approximate dimensions of the RMA waste pile are 1,100 feet by 1,400 feet. A site map of the RMA is included as Figure 1.

The residuals disposed of at the RMA are reportedly dewatered wastewater treatment plant sludges predominantly consisting of unusable paper fibers and clay (89% of the waste disposed at the RMA) and fly ash and bottom ash from the boilers at the mill (10%). Miscellaneous wood and paper wastes such as pallets, shipping material and bales of waste paper are also disposed in the waste pile (<1%). Historical documents report that empty 55-gallon drums may have been disposed in the RMA waste pile in the past. A June 17, 1986 Michigan Department of Natural Resources (MDNR) memorandum states that mill sludges which contained high levels of PCBs from the mill's de-inking lagoon were disposed of in a dumping area identified as the Manistique Pulp and Paper Dump in Hiawatha Township.

The topography surrounding the RMA is generally flat. Based on available file materials and a previous site visit, the thickness of the waste pile is estimated to range from about 20 feet in the south to 50 feet in the north. Standing water has been observed adjacent to the waste pile. Water level information collected during a November 1997 site visit indicates that groundwater generally occurs at approximately 0.1 to 2.5 feet below ground surface (bgs). The estimated groundwater flow direction across the RMA site is northeast at a rate of approximately 55 feet/year based on aquifer parameters discussed in the January 1988 Hydrogeological Study. Gould's Slough Creek and it's associated wetland are located 900 feet northeast of the waste pile (see Figure 1). The subsurface geology at the RMA is generally described in the available file materials as sand overlying fractured, crystalline limestone which occurs at a depth of 5 to 20 feet bgs.

TechLaw conducted a site sampling visit at the RMA on November 17 through 20, 1997. Samples of sludge, soil, sediment, surface water, and groundwater were collected. The analytical results from the sampling event were compared to appropriate media specific screening values and some constituents were detected in samples in excess of the screening values. The results of the November 1997 site inspection are presented in a March 5, 1998 submittal from TechLaw to U.S. EPA. Significant aspects of the sampling results are described here.

- A limited number of volatile organic compounds (VOCs) and semivolatile organic compounds (SVOCs) were detected in sludge samples from the waste pile at the RMA in excess of the Generic Soil Screening Levels (Generic SSLs) found in *Soil Screening Guidance: Technical Background Document* (EPA/540/R-95/128; May, 1996).

- Metals including arsenic, barium, chromium, nickel, and selenium were detected in sludge samples in excess of Generic SSLs at a dilution attenuation factor (DAF) of 1 for the migration to groundwater pathway.

- Toluene was detected in one surface water sample at a level of 15.40 ug/l which is significantly less than the U.S. EPA Region 5-specific Ecological Data Quality Levels (EDQLs) for toluene of 5,000 ug/l.

- VOCs and SVOCs were not detected in any other environmental samples that were collected during the November 1997 site visit.

- Copper was detected in excess of EDQLs in three surface water samples and mercury was detected in one sediment sample at a level equal to the EDQL of 0.174 mg/kg.

- Concentrations of metals in the groundwater in a well point location directly downgradient of, and close to, the waste pile were elevated relative to other groundwater samples that were collected. Lead was detected in this groundwater sample in excess of Safe Drinking Water Act "action levels".

Waste and Soil Sampling

A hollow stem auger will be used to collect nine to twelve waste samples from the waste pile at the RMA. These samples will be collected from three to four borings. Proposed waste pile sampling locations are shown in Figure 2a. Two of the borings (SLG-6 and SLG-7) will be located in the northern half of the waste pile near, but north of, the locations of previous sampling locations SLG-4 and SLG-5. These samples will be collected to confirm the results of the analyses on samples SLG-4 and SLG-5 and learn more about the distribution of VOCs, SVOCs, PCBs and metals in the waste pile. A third boring will be located near the center of the waste pile, also to collect information on the distribution of VOCs, SVOCs, PCBs and metals in the waste pile. A fourth boring will be located in an area deemed appropriate by the field personnel based on all of the previously accumulated boring data from the waste pile. The purpose of this fourth boring would be to collect additional samples for analysis and to further characterize the waste pile. Depending on the materials that are encountered, and considering the materials encountered during the November 1997 borings, the fourth boring will be installed if practical based on the field schedule.

The borings will initially be continuously sampled using a split spoon to two feet below the soil contact underlying the waste pile. Three waste samples will be collected from each boring based on the results of organic vapor screening and visual observations of the waste material. It is anticipated that at least one sample from each boring will be collected from near the bottom of the waste pile. File material and other personnel familiar with this project (i.e., Michigan Department of Environmental Quality [MDEQ] and U.S. EPA Region 5 CERCLA personnel involved with remediation of Manistique Harbor) believe that PCB contaminated sediments may be present near the bottom of the waste pile.

The physical description of the waste samples will be logged for each boring. Recovered waste from the borings will be screened with a photoionization detector (PID), following the procedures detailed in the TechLaw Region 5 Generic QAPP, to aid in identifying samples to be analyzed for VOCs and SVOCs. If no samples from a boring are found to cause a PID response above background levels, one sample from each boring may be selected for analysis for VOCs and SVOCs. Otherwise, TechLaw field personnel may chose not to analyze a waste sample from a boring for VOCs or SVOCs. At least three samples of waste from each boring will be collected for analysis for PCBs and two samples will be collected for analysis for Appendix IX metals (plus titanium) and toxicity characteristic leaching procedure (TCLP) metals. Samples may also be collected for TCLP VOCs and/or SVOCs analysis depending on PID response. VOC samples of the waste in the waste pile will be collected in accordance with SW-846 Method 5035 following the Draft TechLaw SOP on this procedure. En-Core sampling devices will be used if appropriate based on the physical properties of the waste. If fibrous (newsprint-like) waste or gravelly waste are selected for analysis for VOCs then the En-Core method will not be used.

Three to four soil samples from beneath the waste pile may be collected for laboratory analysis. The samples will be analyzed for PCBs and total Appendix IX metals (plus titanium). If PID screening of the soil samples results in a PID response above background levels, the soil samples will also be analyzed for VOCs and SVOCs. VOC samples of the soil from beneath the waste pile will be collected in accordance with SW-846 Method 5035 following the Draft TechLaw SOP on this procedure. En-Core sampling devices will be used.

A summary of waste and soil sample locations, numbers and field/analytical parameters is presented in Table 1. Proposed analytical methods for the waste and soil samples are presented in Table 2. The waste and soil samples will be packaged and shipped to Quanterra in North Canton, Ohio in accordance with the shipping and custody procedure outlined in the TechLaw Region 5 Generic QAPP.

Surface Water and Sediment Sampling

Surface water and co-located sediment samples will be collected from three to four sampling locations surrounding, and potentially northeast of, the waste pile. The sampling stations will be identified in the field based on previous sampling data and ecological factors. The sampling locations will be identified as SW-9/SED-9 through SW-12/SED-12. Approximate sample locations are indicated on Figure 2a.

If easily accessible, surface water samples will be collected by submerging the sample containers directly into the surface water. Those areas only accessible from a distance will be sampled using a pre-cleaned beaker attached to an extendable aluminum pole. If the sediments are readily accessible and not covered by more than six inches of surface water, sediment samples will be collected using a pre-cleaned stainless steel trowel or spoon to transfer the sediment material directly into the sample container. If the sediments are covered by more than approximately six inches of surface water, a hand auger will be used to collect the sample. The sampling procedure to be used will consider the field conditions (e.g., grain size, depth of water, sediment compactness, etc.) at the time of sampling.

Surface water samples will be analyzed for VOCs and total Appendix IX metals (plus titanium). Sediment samples will be analyzed for PCBs, SVOCs and total Appendix IX metals (plus titanium), since these constituents would more likely be bound to sediments than in solution.

A summary of surface wastes and sediment sample locations, numbers and field/analytical parameters is presented in Attachment 1. Proposed analytical methods are presented in Attachment 2. The surface water and sediment samples will be packaged and shipped to Quanterra in North Canton, Ohio in accordance with the shipping and custody procedure outlined in the TechLaw Region 5 Generic QAPP.

Groundwater Sampling

Groundwater samples will be collected from existing monitoring wells at the RMA. Ten groundwater monitoring wells were installed in the area surrounding the RMA in November 1997 See Figure 2b for the monitoring well locations. These monitoring wells have been developed and are suitable for sampling according to Manistique Papers' consultants Bittner Engineering. Based on groundwater flow estimates and previous analytical results, monitoring well W-4R (screened in sand from 13-15.5 feet) will be sampled as a background location. Monitoring well SR-1 (screened in weathered bedrock from 24.5-29.5 feet) will be sampled because it is the only shallow bedrock monitoring well present at the site. TechLaw expects that monitoring well OB-10 (screened from 13-15.5 feet in sand) will also be sampled and possibly OB-14 (screened from 2.5-4.5 feet in sand). Other wells may be substituted for OB-10 and OB-14 depending on access and field judgement. Likely replacements include OB-12 or OB-15.

Monitoring wells will be purged and sampled using a pre-cleaned disposable bailer. The wells will be purged of three to five groundwater well volumes prior to sampling. Indicator parameters, including pH, specific conductivity and temperature, will be measured before purging and after each well volume is extracted.

All groundwater samples will be analyzed for VOCs, SVOCs, PCBs, total Appendix IX metals (plus titanium), sulfide and nitrate-nitrite. Groundwater sample analytical parameters are based on previous sampling results, sampling results presented in the file materials and the anticipated characteristics of the RMA waste materials.

Proposed analytical methods are presented in Table 2. The groundwater samples will be packaged and shipped to Quanterra in North Canton, Ohio in accordance with the shipping and custody procedure outlined in the TechLaw Region 5 Generic QAPP.

Wetland Delineation Activities

As discussed with Ms. Diane Sharrow, the U.S. EPA Technical Lead for this project, a TechLaw ecologist will collect information during the site visit concerning the wetlands in the area surrounding the RMA waste pile. Data will be collected during site walk throughs. Areas will be videotaped and observations will be recorded in field notebooks. The wetlands data that is collected will be presented in the final report that TechLaw prepares following the completion of the activities described in this SAP.

Waste Sampling at the Paper Mill

As discussed with Ms. Sharrow of U.S. EPA, TechLaw will be prepared to collect up to four samples of waste from the paper mill. The waste that TechLaw will be prepared to sample will be non-liquid waste that would be expected to be disposed at the RMA such as boiler ash or sludge from the wastewater treatment plant, located in a consolidation area that is easily accessible. Due to health and safety concerns and due to limited contact with the facility regarding the waste management practices at the paper mill, TechLaw personnel will be limited to collecting waste samples from locations that the TechLaw Site Safety Supervisor (Mr. Todd Quillen) deems as safe. The location of the paper mill relative to the RMA is included in Figure 3.

Waste samples that are collected from the paper mill will be collected with appropriate sampling equipment such as a stainless steel spoon or a plastic beaker depending on the nature of the waste. Samples will be containerized in appropriate preservative free sample containers. Samples will be analyzed for Toxicity Characteristic Leaching Procedure (TCLP) metals, VOCs or SVOCs depending on the process that generates the waste, consultation with Ms. Sharrow if appropriate, and the judgement of the members of the field team.

Proposed analytical methods are presented in Table 2. The waste samples will be packaged and shipped to Quanterra in North Canton, Ohio in accordance with the shipping and custody procedure outlined in the TechLaw Region 5 Generic QAPP.

Quality Control Samples

During the collection of waste, soil, surface water, sediment, and groundwater samples at the RMA, the TechLaw sampling teams will collect one field duplicate for every 10 samples, per matrix collected. In addition, equipment blanks will be collected at a frequency of one for every 10 samples, per matrix collected. Therefore, equipment blanks will be collected from the following sampling equipment: groundwater bailer; surface water sample beaker; sediment auger and/or PVC sampling pipe; and, the drill rig split spoon. Duplicates and equipment blanks will be analyzed for the same constituents as the associated samples. No additional duplicates or equipment blanks will be collected in association with the waste samples collected at the paper mill.

Trip blanks, consisting of analyte-free, deionized water, will be prepared by the laboratory, shipped to the sampling site, and placed in coolers and handled/shipped in the same manner as all aqueous VOC samples. The trip blanks will be analyzed in the laboratory for VOCs. One matrix spike/matrix spike duplicate (MS/MSD) sample will be collected for every 20 samples of each matrix collected. Since there will be no more than 20 samples collected for each matrix, one MS/MSD sample will be collected for each media being sampled (i.e., waste, soil/sediment, surface water and groundwater). MS/MSD samples will be analyzed for the same constituents as those in the sample matrix being analyzed.

Laboratory quality control requirements are outlined in the TechLaw Region 5 Generic QAPP and the analytical methods listed in Table 2.

Sample Collection, Preparation, Custody and Shipment

The samples collected by TechLaw will remain in the custody of TechLaw field personnel until relinquished for shipment to the analytical laboratory. The sample bottles will be appropriately labeled (label affixed directly on the face of the bottle) and tagged with U.S. EPA sample tags. A chain-of-custody (COC) form will accompany the samples from the point of origin to the analytical laboratory. The samples will be collected in containers specified in Section 6 of the U.S. EPA approved, TechLaw Generic QAPP. All samples will be collected in "certified-clean" sample containers obtained from Quanterra. All split samples will be shipped via overnight carrier in coolers to Quanterra Environmental Services, 4101 Shuffel Drive, NW, North Canton, Ohio, Attn: David Heakin (phone 330/497-9396).

Investigation Derived Waste Management

IDW will be drummed and prepared for shipment under manifest by a hazardous waste transporter. Based on TechLaw's November 1997 sampling results, elevated levels of certain metals were identified. Therefore, the IDW that is generated will be shipped under waste codes D004, D005, D006, D007, D008, D010, and D011. Because it is possible that PCBs may be present in the waste pile, the drill cuttings from the waste pile will also be shipped as PCB containing waste.

The waste will be removed from the site under the supervision of a TechLaw representative. It is currently anticipated that the waste will be removed from the RMA on Friday June 12, 1998 by Heritage Environmental Services, Inc. in Indianapolis, Indiana. However, a possibility remains that the waste will not be removed from the site until sometime during the week of June 15 to 19, 1998, possibly by Superior Special Services, Inc. TechLaw will maintain contact with Ms. Diane Sharrow of U.S. EPA regarding the disposition of the IDW and it's final disposition will be included in the trip report submitted for this sampling visit.

Analytical Requirements

The analytical and QA/QC requirements (including calibration procedures and frequencies) for the laboratory are outlined in the U.S. EPA-approved, TechLaw Generic QAPP. Analytical reporting limits are based on the method and SW-846 requirements. The analytical methods and sample container, preservation and holding time requirements are shown in Table 2.

Data Validation

Analytical data will be generated by the subcontractor laboratory and provided to TechLaw in conformance with CLP-like reporting protocols. The resulting data will undergo a 100 percent data validation effort by a member of the TechLaw Team, independent of the sampling team. This validation will be in conformance with the Functional Guidelines for Organic and Inorganic Data Validation. Specific data package and data validation requirements are outlined in the U.S. EPA-approved, TechLaw Generic QAPP.

Project Schedule and Report Deliverables

The sampling activities will be initiated on June 9, 1998 and are expected to continue for three to four days. A data validation report will be generated within 21 days of receiving the laboratory data package for the final analysis. Within 21 days of the receipt of the data validation report, a final sampling report will be prepared and submitted to the EWAM. As discussed with the EWAM, the report will include the waste, soil, surface water, sediment and groundwater analyses. This report will detail the sampling locations and techniques, any problems that were encountered and any other observations, including photographs, made during the sampling activities.

Project Organization

The EWAM for this project is Mr. Brian Freeman. The U.S. EPA Technical Lead is Ms. Diane Sharrow. The TechLaw WAM for this project is Ms. Patricia Brown-Derocher and the TechLaw Technical Lead for this project is Mr. Todd Quillen. TechLaw Site Safety Officer (SSO) and field sampling personnel are Mr. Todd Quillen (Team Leader and SSO), Mr. Mark Griffith, Mr. Anthony Mubiru, and Mr. Kevin Higgins. Mr. Griffith and Mr. Higgins will primarily be responsible for the collection of surface water and sediment samples. Mr. Quillen and Mr. Mubiru will be primarily responsible for the sampling of waste, soil and groundwater. Mr. Griffith, who is an ecologist, and Ms. Theisen will identify potentially ecologically-sensitive areas to assist in the collection of the surface water and sediment samples and will be responsible for collecting the wetlands delineation data. The laboratory for this project is Quanterra Environmental Services in North Canton, Ohio. Data validation will be performed by appropriately qualified members of the TechLaw Team.

FIGURE 1

SITE VICINITY MAP

FIGURES 2A AND 2B

SAMPLE LOCATION MAPS

FIGURE 3

PAPER MILL LOCATION MAP

TABLE 1

SAMPLE COLLECTION SUMMARY

TABLE 1

SAMPLE COLLECTION SUMMARY

Area	Matrix	No. of Locations	Sample Depths	Field Parameters	Analytical Parameters *	Field Blanks	Field Dups.	MS/MSDs
Waste Pile	Sludge	3-4 Borings; 9-12 Samples	Based on Field Parameters	PID Screening - VOCs	VOCs, SVOCs, PCBs, Total App. IX metals+Ti, TCLP Metals	1 or 2 (1 per 10)	1 or 2 (1 per 10)	1 (1 per 20)
Beneath Waste Pile	Soil	3-4	0 - 6"	PID Screening - VOCs	VOCs, SVOCs, PCBs, Total App. IX metals+Ti	1 (1 per 10)	1 (1 per 10)	1 (1 per 20)
Wetlands/SW Courses	SW	3-4	Surface	pH, Cond., Temp	VOCs, Total App. IX Metals + Ti	1 (1 per 10)	1 (1 per 10)	1 (1 per 20)
Wetlands/SW Courses	Sed.	3-4	0 - 6"	None	SVOCs, PCBs, Total App. IX Metals + Ti	1 (1 per 10)	1 (1 per 10)	1 (1 per 20)
Groundwater	GW	4	Middle of well screen	pH, Cond., Temp	VOCs, SVOCs, PCBs, Total App. IX metals+Ti, Sulfide, Nitrate-Nitrite	1 (1 per 10)	1 (1 per 10)	1 (1 per 20)
Waste from Paper Mill	Sludge	0-4	Not applicable	None	TCLP VOCs, TCLP SVOCs, PCBs, TCLP metals	None	None	1 (1 per 20)

* TechLaw will be prepared to collect samples for all of these analyses. As described in the accompanying text, the actual parameters will be finalized based on field conditions.

TABLE 2

ANALYTICAL METHODS AND SAMPLE CONTAINER, PRESERVATION AND HOLDING TIME REQUIREMENTS

Parameters	Analytical Method	Matrix	Holding Time	Container	Preservative
VOCs	SW-846 Method 5035 SW-846 Method 8260B	Waste, Soil, Sediment SW, GW	48 Hours 14 Days	En-Core 2 X 40 ml vials w/septum caps	Cool to 4^0 C HCl to pH<2, Cool to 4^0 C
SVOCs	Prep: SW-846 Method 3510C Anal: SW-846 Method 8270C Prep: SW-846 Method 3550C Anal: SW-846 Method 8270C	SW, GW Waste, Soil, Sediment	7 Days to Extraction, 40 Days to Analysis 14 Days to Extraction, 40 Days to Analysis	2, 1-Liter Amber Glass 1, 8-oz. glass jar	Cool to 4^0 C Cool to 4^0 C
PCBs	Prep: SW-846 Method 3510C Anal: SW-846 Method 8082 Prep: SW-846 Methods 3550C Anal: SW-846 Method 8082	SW, GW Waste, Soil, Sediment	7 Days to Extraction, 40 Days to Analysis 14 Days to Extraction, 40 Days to Analysis	1, 1-Liter Amber Glass 1, 8-oz. glass jar	Cool to 4^0 C Cool to 4^0 C
App. IX Metals (plus titanium)*	Prep: SW-846 Method 3005 Anal: SW-846 Method 6010B/7000 Prep: SW-846 Method 3050 Anal: SW-846 Method 6010B/7000	SW, GW Waste, Soil, Sediment	6 months 6 months	1-Liter Poly Bottle 1, 8-oz. glass jar	HNO_3 to pH<2; Cool to 4^0 C Cool to 4^0 C
Mercury	Prep: SW-846 Method 7470A Prep: SW-846 Method 7471A	SW, GW Waste, soil, sediment	28 days 28 days	1-Liter Poly Bottle 1, 8-oz. glass jar	HNO_3 to pH<2; Cool to 4^0 C Cool to 4^0 C
TCLP Metals	Prep: SW-846 Method 1311 Anal: SW-846 Method 6010B	Waste	6 months	4-oz. glass jar	Cool to 4^0 C
TCLP Mercury	Prep: SW-846 Method 1311 Anal: SW-846 Method 7471A	Waste	28 days	4-oz. glass jar	Cool to 4^0 C

Parameters	Analytical Method	Matrix	Holding Time	Container	Preservative
Sulfide	SW-846 Method 9030B	Waste	7 days	4-oz. glass jar	Cool to 4^{0} C
	MCAWW Method 376.1	GW	7 days	500 ml glass	ZnAcetate + NaOH, pH>9; Cool to 4^{0} C
Nitrate-Nitrite	MCAWW Method 353.2	GW	2 days	500 ml glass	Cool to 4^{0} C

* If arsenic, antimony, lead, selenium, and thallium are not detected by ICP, appropriate 7000 Series AA methods will be applied.

DRE-8J

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. Leif Christensen
President and General Manager
Manistique Papers, Incorporated
453 South Mackinac Road
Manistique, Michigan 49854

RE: RCRA §3007 Information Request
Manistique Papers, Incorporated
RCRA I.D. No.: MID 981 192 628

Dear Mr. Christensen:

This letter and the enclosed document constitute a request for information by the United States Environmental Protection Agency (U.S. EPA), pursuant to U.S. EPA's authority under § 3007 of the Resource Conservation and Recovery Act, 42 U.S.C. § 6901 et seq., as amended (RCRA), and any regulations promulgated pursuant thereto. The information requested relates to the generation, storage, transportation, treatment, disposal, discharge and release of solid waste, hazardous waste and hazardous waste constituents by or from the referenced facility at the address listed above and in Schoolcraft County, Michigan.

Manistique papers, Incorporated (MPI) may, pursuant to Title 40 of the Code of Federal Regulations (40 CFR) 2.203(a), assert a business confidentiality claim covering all or part of the information requested by U.S. EPA in a manner described in 40 CFR 2.203(b). Information covered by such a claim will be disclosed by U.S. EPA only to the extent and by means of the procedures set forth in 40 CFR Part 2, Subpart B. MPI must make any request for confidentiality when it submits its response, since any information not so identified may be made available to the public without further notice. Such claims must be accompanied by written substantiation of the claim by answering the following questions:

1. Which portions of the information do you claim are entitled to confidential treatment?

2. For how long is confidential treatment desired for this information?

3. What measures have you taken to guard against undesired closure of the information to others?

4. To what extent has the information been disclosed to others, and what precautions have been taken in connection with that disclosure?

5. Has the U.S. EPA or any other Federal agency made a pertinent confidentiality determination? If so, include a copy of such determination or reference to it if available.

6. Will disclosure of the information be likely to result in substantial harmful effects on your competitive position? If so, what would those harmful effects be and why should they be viewed as substantial? Explain the causal relationship between disclosure and the harmful effects.

The written statements submitted by MPI pursuant to this Information Request must be notarized and submitted under an authorized signature certifying that all statements contained therein are true and accurate to the best of the signatory's knowledge and belief. In addition, any documents submitted to U.S. EPA pursuant to this Information Request should be certified as true and authentic to the best of the signatory's knowledge or belief.

Should the signatory find, at any time after submittal of the requested information, that any portion of the submitted information is false, misleading or incomplete, the signatory should so notify U.S. EPA. If any of the submitted information certified as true should be found to be untrue or misleading, the signatory can and may be prosecuted pursuant to 18 U.S.C. § 1001.

U.S. EPA has the authority to use the information requested herein in an administrative, civil, or criminal action. This Information Request is not subject to the approval requirements of the Paperwork Reduction Act of 1980, 44 U.S.C. § 3501, _et seq_.

MPI's response to the attached Information Request must be provided within thirty (30), days of the certified receipt date of this letter, notwithstanding its possible characterization as confidential business information (CBI). If an extension of time is necessary to complete the response, the request for an extension must be made in writing to Ms. Diane Sharrow, at the address listed below.

Failure to respond to a request for information under § 3007 of RCRA, or adequately justify such failure to respond, can result in enforcement action by the U.S. EPA pursuant to § 3008 of RCRA, with penalties of up to $25,000 per day of violation.

Please address MPI's response to U.S. EPA's Information Request to Ms. Sharrow, Enforcement and Compliance Assurance Branch (DRE-8J), U.S. EPA, 77 W. Jackson Blvd., Chicago, IL, 60604-3590. If you have any questions regarding this letter, please contact Ms. Sharrow of the RCRA Enforcement Branch at (312) 886-6199, or Ms. Deborah Garber of the Office of Regional Counsel at (312) 886-6610.

Sincerely yours,

Paul Little, Chief
Michigan Wisconsin Section
Enforcement and Compliance Assurance Branch
Waste, Pesticides and Toxics Division

Enclosure

cc: J. Sygo, MDNR-WMD-Lansing
R. Schmeling, MDNR-Marquette

bcc: Author
Section
Branch
D. Garber, ORC
C. Bury, WD

DRE-8J\DSHARROW\DSHARROW\6-6199\SHARROW\MANISTIQ.UE\July 29, 1998

SIGNOFF:

AUTHOR	TYPIST	SECTION CHIEF

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5

MANISTIQUE PAPERS, INCORPORATED	)	Information Request Pursuant
453 SOUTH MACKINAC ROAD	)	to Section 3007 of the
MANISTIQUE, MICHIGAN	)	Resource Conservation and
RCRA EPA ID NO.: MID981192628	)	Recovery Act as amended,
	)	42 U.S.C. § 6927

This Information Request is a request by the United States Environmental Protection Agency (U.S. EPA) issued pursuant to Section (§) 3007 of the Resource Conservation and Recovery Act, as amended, 42 U.S.C. § 6927. The issuance of this Information Request serves to require Manistique Papers, Incorporated (MPI), to submit information relating to MPI's generation, treatment, transportation, storage, disposal, discharge and release of solid waste, hazardous wastes and hazardous waste constituents at or from MPI, 453 South Mackinac Road, Manistique, Michigan, and in Schoolcraft County, Michigan.

I. INSTRUCTIONS

This Information Request is directed to MPI, its officers, directors, employees, contractors, consultants, and its subsidiaries, divisions, facilities and their officers, directors, employees, contractors and consultants. This Information Request pertains to any and all information MPI, and its corporate predecessors, may have regarding the generation, treatment, transportation, storage, disposal or release of solid and hazardous waste at or from the MPI operations located at 453 South Mackinac, Manistique, Michigan, and in Schoolcraft County, Michigan.

If any information called for herein is not available or not accessible in the full detail requested, the Information Request shall be deemed to call for providing the best information available. The Information Request also requires the production of all information called for in as detailed a manner as possible based upon such information as is available or accessible.

The information must be provided notwithstanding its possible characterization as confidential business information or trade secrets. MPI is entitled to assert a claim of confidentiality pursuant to Title 40 of the Code of Federal Regulations (40 CFR), 2.203(b) for any information produced that, if disclosed to persons other than officers, employees, or duly authorized representatives of the United States, would divulge information entitled to protection as a trade secret. Any information which the Administrator of U.S. EPA determines to constitute methods, processes or other business information entitled to protection as a trade secret will be maintained as confidential pursuant to the procedures set forth in 40 CFR Part 2. MPI must make its request for confidential treatment when it provides such information since any information not so identified will not be accorded this protection by U.S. EPA.

The written statements and documents submitted pursuant to this Information Request must be notarized and returned under an authorized signature certifying that all statements contained therein are true and accurate to the best of the signatory's knowledge and belief. Should the signatory find at any time after submittal of the requested information that any portion of this submittal certified as true is false or misleading, the signatory should so notify U.S. EPA immediately. If any information submitted under this information request is found to be untrue or misleading, the signatory can be prosecuted under 18 U.S.C. § 1001. U.S. EPA has the authority to use the information requested herein in an administrative, civil, or criminal action. This Information Request is not subject to the approval requirements of the Paperwork Reduction Act of 1980, 44 U.S.C. § 3501 et seq.

The information requested herein must be provided, within thirty (30) days following the certified receipt of this Information Request, to the U.S. EPA, Region 5, Enforcement and Compliance Assurance Branch (DRE-8J), 77 West Jackson Blvd., Chicago, Illinois 60604-3590, Attention: Ms. Diane Sharrow.

II. DEFINITIONS

1. "Authorized representative" means the person responsible for overall operation of a facility or an operational unit, e.g., plant manager, superintendent, or person of equivalent responsibility. (See R 299.9101 or 40 CFR 260.10.)

2. "Discharge" or "hazardous waste discharge" means the accidental or intentional spilling, leaking, pumping, pouring, emitting, emptying, or dumping of hazardous waste into or on any land or water. (See R 299.9102 or 40 CFR 260.10.)

3. "Disposal" means the discharge, deposit, injection, dumping, spilling, leaking or placing of any solid waste or hazardous waste into or on any land or water so that such solid waste or hazardous waste or any hazardous constituent thereof may enter the environment or be emitted into the air or discharged into any waters, including groundwater. (See R 299.9102 or 40 CFR 260.10.)

4. "Disposal facility" means a facility or part of a facility at which hazardous waste is intentionally placed into or on any land or water, and at which waste will remain after closure. (See R 299.9102 and 40 CFR 260.10.)

5. "Document" means all written, typewritten, drawn or printed materials including, but not limited to, correspondence, letters, agreements, contracts, drawings, memoranda, blueprints, manifests, logs, invoices, and photographs, and all information recorded on electronic or magnetic media.

6. "Facility" means all contiguous land and structures, other appurtenances and improvements on the land used for treating, storing or disposing of hazardous waste. A facility may consist of several treatment, storage, or disposal operational units (e.g., one or more landfills, surface impoundments or combinations of them). (See R 299.9103 or 40 CFR 260.10.)

7. "Hazardous waste" means a hazardous waste as defined in R 299.9203 or 40 CFR 261.3.

8. "Hazardous constituent" means a chemical compound which is listed in Part 2 of the Act 64 Administrative Rules or 40 CFR Part 261, Appendix VIII.

9. "Landfill" means a disposal facility or part of a facility

where hazardous waste is placed in or on land and which is not a pile, a land treatment, a surface impoundment, an underground injection well, a salt dome formation, a salt bed formation, an underground mine, or a cave. (See R 299.9105 or 40 CFR 260.10.)

10. "Land treatment facility" means a facility or part of a facility at which hazardous waste is applied onto or incorporated into the soil surface. (See R 299.9105 or 40 CFR 260.10.)

11. "Management" or "hazardous waste management" means the systematic control of the collection, source separation, storage, transportation, processing, treatment, recovery and disposal of hazardous waste. (See R 299.9105 or 40 CFR 260.10.)

12. "On-site" means the same or geographically contiguous property which may be divided by public or private right-of-way, provided the entrance and exit between the properties is at a cross-roads intersection, and access is by crossing as opposed to going along, the right-of-way. Noncontiguous properties owned by the same person but connected by a right-of-way which that person controls and to which the public does not have access is also considered on-site property. (See R 299.9106 or 40 CFR 260.10.)

13. "Operator" means the person responsible for the overall operation of the facility. (See R 299.9106 or 40 CFR 260.10.)

14. "Owner" means the person who owns a facility or part of a facility. (See R 299.9106 or 40 CFR 260.10.)

15. "Person" means an individual, trust, firm, joint stock company, Federal Agency, corporation (including a government corporation), partnership, association, State, municipality, commission, political subdivision of a State, or any interstate body. (See R 299.9106 or 40 CFR 260.10.)

16. "Personnel" or "facility personnel" means all persons who work, at, or oversee the operations of, a hazardous waste facility, and whose actions or failure to act may result in noncompliance. (See R 299.9106 and 40 CFR 260.10.)

17. "Pile" means any non-containerized accumulation of solid, non-flowing, hazardous waste that is used for treatment or storage. (See R 299.9106 or 40 CFR 260.10.)

18. "Representative sample" means a sample of a universe or whole which can be expected to exhibit the average properties of the universe or whole. (See R 299.9107 or 40 CFR 260.10.)

19. "RCRA" means the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, as amended, 42 U.S.C. section 6901 et seq. (See Act No. 64 of the Public Acts of 1979, as amended, being § 299.501 et seq. of the Michigan Compiled Laws.)

20. "Sludge" means any solid, semi-solid, or liquid waste generated from a municipal, commercial, or industrial solid treatment plant, water supply treatment plant, or air pollution control facility exclusive of the treated effluent from a solid treatment plant. (See R 299.9107 or 40 CFR 260.10.)

21. "Solid waste" means any garbage, refuse, sludge from a waste treatment plant, or air pollution control facility and other discarded material including solid, liquid, semisolid, or contained gaseous material resulting from industrial, commercial, mining and agricultural operations, and from community activities, but does not include solid or dissolved material in domestic sewage, or solid or dissolved materials in irrigation return flows or industrial discharges which are point sources subject to permits under Section 402 of the **Federal** Water Pollution Control Act, as amended, or source, special nuclear, or byproduct material as defined by the Atomic Energy Act, as amended. (See 42 U.S.C. § 6927). **NOTE: Discharge of leachate from waste management units to groundwater is not excluded from the definition of solid waste in RCRA §1004(27).**

22. "Storage" means the holding of hazardous waste for a temporary period, at the end of which the hazardous waste is treated, disposed of or stored elsewhere. (See R 299.9107 or 40 CFR 260.10.)

23. "Sump" means any pit or reservoir that meets the definition of tank and those troughs/trenches connected to it that serve to collect hazardous waste for transport to hazardous waste storage, treatment, or disposal facilities. (See R 299.9107 or 40 CFR 260.10.)

24. "Surface impoundment" or "impoundment" means a facility or part of a facility which is a natural topographic depression, man-made excavation, or diked area formed primarily of earthen materials (although it may be lined with man-made materials) which is designed to hold an accumulation of liquid wastes or wastes containing free liquids, and which is not an injection well. Examples of surface impoundments are holding, storage, settling, and aeration pits, ponds, and lagoons. (See R 299. 9107 or 40 CFR 260.10.)

25. "Tank" means a stationary device, designed to contain an accumulation of hazardous waste which is constructed primarily of non-earthen materials which provide structural support. (See R 299.9108 or 40 CFR 260.10.)

26. "Transportation" means the movement of hazardous waste by air, rail, highway or water. (See R 299.9108 or 40 CFR 260.10.)

27. "Treatment" means any method, technique or process, including neutralization, designed to change the physical, chemical or biological character or composition of any hazardous waste so as to neutralize such waste, or so as to recover energy or material resources from the waste or so as to render such waste nonhazardous or less hazardous; safer to transport, store or dispose of; or amenable for recovery, amenable for storage or reduced in volume. (See R 299.9108 or 40 CFR 260.10.)

28. "Underground tank" means a device meeting the definition of tank whose entire surface area is totally below the surface of and covered by the ground. (See R 299.9109 or 40 CFR 260.10.)

29. "Underground storage tank" means any one or combination of tanks (including underground pipes connected thereto) that is used to contain an accumulation of regulated substances, and the volume of which (including the volume of underground pipes connected thereto) is 10 percent or more beneath the surface of the ground. (See 40 CFR 280.12.)

30. "Wetland" is defined as those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. (See 1987 United States Army Corps of Engineers Wetlands Delineation Manual.)

III. REQUEST FOR ANSWERS TO QUESTIONS AND THE PRODUCTION OF DOCUMENTS

1. Did MPI generate solid waste after November 8, 1980?

2. Has MPI generated a solid, liquid, semi-solid or contained gaseous material since November 8, 1980?

3. Was any of the material identified by MPI in Item 2, discarded, or had it served its intended purpose, or was it a manufacturing or mining byproduct?

4. Provide a list of the material identified by MPI in Item 3.

5. For each distinct waste or waste stream identified by MPI in response to Item 4, address the following:

a. Was the waste generated by MPI on a regular, an intermittent or a one-time basis?

b. Where was the waste physically generated?

c. Was the waste generated by MPI stored prior to disposal?

d. Was the MPI generated waste mixed with any other waste prior, during or after storage and disposal?

e. Where was the waste stored or treated prior to transport or disposal?, and

f. Who transported the waste for disposal?

6. Was any of the material listed in Item 4 by MPI excluded under R 299.204 or 40 CFR 261.4(a) because it was domestic sewage, a Clean Water Act point source discharge, an irrigation return flow, an Atomic Energy Commission special nuclear or byproduct material, or an in-situ mining waste?

7. Provide a list of the material identified by MPI in Item 6 as excluded under R 299.204 or 40 CFR 261.4(a).

8. Provide any prepared documents that analyze or describe any MPI material excluded under R 299.204 or 40 CFR 261.4(a) as a Clean Water Act point source discharge, or any prepared documents that determine or conclude that any material point source discharged is excluded under R 299.204 or 40 CFR 261.4(a).

9. Provide a list of the material generated by MPI since November 8, 1980, that is a RCRA solid waste regardless of whether it was discarded, used, reused, recycled, reclaimed, or stored or accumulated for the purposes of discarding, using, reusing, recycling or reclaiming.

10. Was any solid waste generated by MPI placed into a wetland?

11. Has MPI ever applied for a Section 404 permit from the Michigan Department of Natural Resources, the Michigan Department of Environmental Quality, or the United States Army Corps of

Engineers for the Residuals Management Area (RMA)[1]?

12. Has MPI ever received a Section 404 permit from the Michigan Department of Natural Resources, the Michigan Department of Environmental Quality, or the United States Army Corps of Engineers for the RMA?

13. Is any of the material identified by MPI in Item 9 excluded from regulation under R 299.204 or 40 CFR 261.4(b)?

14. Provide a list of the material generated by MPI since November 18, 1980, which is excluded under R 299.204 or 40 CFR 261.4(b).

15. What is MPI's program for establishing the characteristics of both solid and hazardous waste at MPI in accordance with R 299.302 or 40 CFR 262.11?

16. Does the program described by MPI in response to Item 15 include any of the following, and if so, please describe any variations in the program for establishing the characteristics of the waste for each specific waste:

a. coal ash
b. leachate
c. sludge
d. flyash
e. filter cake
f. contents of drums
g. contents of containers, and
h. any other solid waste.

17. How has the program described in response to Item 15 changed, or been altered since November 1980, with respect to the following:

a. system changes?
b. process changes?
c. plant upsets?
d. shutdown of the green wood pulp mill in 1984?

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1 The RMA may also be known variously as the RMA, PERM, residuals area, sludge dump, or dump. The RMA may generally be described as the E ½ of the SW 1/4 of Section 36, T42N R16W of Hiawatha Township in Schoolcraft County, and is located approximately 1 mile east of M-94 and 1.5 miles north of MPI with access off Frankovitch Road.

e. sludges from ponds, settling ponds, basins, settling basins, slips, lagoons, slip lagoons, piles, impoundments or surface impoundments?
f. spills?
g. leaks?
h. changes in specialty paper production?
I. construction of the wastewater treatment plant, the addition of secondary treatment, and modifications to the wastewater treatment plant?
j. pump maintenance and failures?
k. sump maintenance and failures?
l. changes in chemicals used to remove paper contaminants?
m. sewer line maintenance and breaks?
n. equipment maintenance and oil leaks?
o. underground tank maintenance and leaks?
p. underground storage tank maintenance and leaks?
q. reduction in the number of NPDES permitted outfalls?, and,
r. Changes in raw materials, including but not limited to, additives and recycled paper sources?

18. On October 15, 1985, a leaking PCB transformer was found at MPI (See TSCA-V-C-536 Consent Decree). Where was the waste from cleanup/remediation of the MPI PCB transformer leak disposed?

19. How long has MPI owned the RMA?

20. How long has MPI operated the RMA?

21. Has the areal extent of the RMA been extended by MPI since 1976?

22. Was creep (movement of the waste material due to gravity, weight of overlying materials, etc.) accounted for by MPI in the response to Item 21?

23. Provide copies of any documents MPI may possess, including photography and aerial photography, that pertains to the responses to Items 21 and 22.

24. Were access roads, offsite roads and on-site haul roads constructed primarily of sludge and ash material that immediately surround the RMA accounted for in the responses to Items 21 and 22?

25. Did MPI ever apply for any permits to construct, expand or operate the RMA?

26. If the response to Item 25 is yes, list the permits applied for, and the entity to which the application(s) were sent (including, but not limited to any application to the local health department, Corps of Engineers, and the 1978 Act 641 application submitted to Michigan DNR).

27. Describe MPI's past and current security at the RMA to prevent disposal of non-MPI waste at the RMA.

28. Describe any incidents of non-MPI waste being managed, stored, treated or disposed at the RMA.

29. Were drums, barrels or other containers ever stored or disposed at the RMA? If so, please indicate when and how it was determined whether those drums, barrels or containers contained solid or hazardous waste?

30. Identify the person(s) responsible for operation and maintenance of the RMA since 1980.

31. Indicate whether the following persons were ever employed, or continue to be employed by MPI, and in what position: Nick Frankovitch, Jan Reque, Robert Bonish, Nick Beaudre, Grant Taylor, Dave Blahnik, John Garvin, Richard Aldrich, Darryl Carlson, John Johnson, Lauren Edwards, Bob Taylor, Eric Bourdeau, Tom Arnold, Jason Panek, James Cook and Henry Swanson.

32. Has any solid waste generated by MPI been disposed of in any other location in Schoolcraft County since 1980?

33. If the answer to Item 32 is yes, list the locations of disposal.

34. Provide copies of sampling and analysis data for solid waste generated by MPI since 1980, including how the waste was sampled (representativeness), the number of samples, and the quality control and assurance provided by the persons performing the sampling and the analysis.

35. List the chemical constituents of any waste stream identified in response to Item 3, if the chemical analysis requested in Item 34 is not available for that waste stream.

36. Is the RMA an engineered unit?

37. If the response to Item 36 is yes, provide any maps, locational drawings, blueprints, etc., related to design, construction and maintenance of the unit.

38. Provide the following notarized certification by a responsible company officer:

> I certify under penalty of law that I have personally examined and am familiar with the information submitted in responding to this Information Request for production of documents. Based on my review of all relevant documents and inquiry of those individuals immediately responsible for providing all relevant information and documents, I believe that the information submitted is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Issued this _______________ day of _____________________, 1997.

____

Paul Little, Chief
Michigan Wisconsin Section
Enforcement and Compliance Assurance Branch
Waste, Pesticides and Toxics Division
United States Environmental Protection Agency
Region 5

cc: D. Sharrow

TECHLAW INC.

20 NORTH WACKER DRIVE, SUITE 1260, CHICAGO, IL 60606
PHONE: (312) 578-8900
FAX: (312) 578-8904

RZ2.R05020.01.ID.256

June 8, 1998

Mr. Brian Freeman
U.S. Environmental Protection Agency
Region 5 DE-9J
77 West Jackson Boulevard
Chicago, Illinois 60604

Reference: EPA Contract No. 68-W4-0006; Work Assignment No. R05020 QAPP Screening and Development; Manistique Papers, Inc., Hiawatha, MI; EPA ID No. MID981192628; Site-Specific Field Sampling and Analysis Plan; Task 05 Deliverable

Dear Mr. Freeman:

Please find enclosed TechLaw's Site-Specific Field Sampling and Analysis Plan (SAP) for sampling activities proposed at the Manistique Papers, Inc. (Manistique Papers) Residuals Management Area (RMA) in Hiawatha, Michigan. This SAP also includes the anticipated sampling and analyses proposed at the Manistique Papers paper mill located in Manistique, Michigan. Continued assistance with sampling and analysis at the Manistique Papers RMA was requested in your March 24, 1998 Technical Direction memorandum (TDM). Assistance with the collection and analysis of samples from waste streams at the Manistique Papers paper mill was requested during several phone conversations between Mr. Todd Quillen, of TechLaw, and Ms. Diane Sharrow, the U.S. EPA technical contact for this site.

This SAP proposes the collection of waste, soil, surface water, sediment and groundwater samples necessary to assist U.S. EPA Region 5 in determining whether the waste pile at the RMA contains hazardous waste or hazardous constituents, including PCBs, and whether these hazardous constituents have potentially impacted biological receptors, including wetlands and surrounding surface water bodies. Also, as requested by Ms. Sharrow, this SAP proposes the collection of information which would be useful for delineating wetlands in the area surrounding the RMA.

A review of available file materials and a previous sampling site inspection at the RMA has provided TechLaw with information on potential contaminants at the RMA. TechLaw has recommended specific analyses for each media based on the available information. In a limited number of cases, the detection limits for certain analyses may be greater than U.S. EPA Region 5 Ecological Data Quality Levels (EDQLs) for these methods. However, the data generated as a result of the proposed sampling and analyses should be of sufficient quantity and quality to make decisions concerning potential ecological impacts.

Sampling is anticipated to begin on June 9, 1998 and continue for three to four days.

TechLaw will use SW-846 Method 5035 for the collection of soil samples for volatile organic compounds analysis. TechLaw's Standard Operating Procedure (SOP) for this method will be submitted to U.S. EPA under separate cover.

Please feel free to contact me or Mr. Todd Quillen, the TechLaw Technical Lead, at 312/345-8915 if you have any questions.

Sincerely,

Patricia Brown-Derocher

Patricia Brown-Derocher
Regional Manager

Enclosure

cc: F. Norling, EPA Region 5 (w/out attachment)
D. Sharrow, EPA Region 5
W. Jordan, Central Files
T. Quillen
Chicago Central Files

c:\ehs\20\20id256.wpd

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

REPLY TO THE ATTENTION OF:
CS-13J

18 May 1998

CERTIFIED MAIL
RETURN RECEIPT REQUESTED and by
FACSIMILE

Steven Nadeau
Honigman Miller Schwartz and Cohn
2200 First National Building
660 Woodward Avenue
Detroit, Michigan 48226-3583

Dear Mr. Nadeau:

The United States Environmental Protection Agency (U.S. EPA), Region 5, will be conducting a sampling inspection, under the authority of the Resource Conservation and Recovery Act (RCRA), at the Manistique Paper, Incorporated (MPI), Residual Management Area (RMA), in early June 1998. As you are aware, U.S. EPA sampled the RMA in November 1997. However, U.S. EPA would like to sample the RMA once again.

There are several reasons for this additional sampling, but the main reason being that Intertek Testing Services (ITS)[1], of Richardson, Texas, a subcontractor laboratory to TechLaw, Inc., (TechLaw[2]), a U.S. EPA Contractor, recently notified the U.S. EPA of irregularities in its data reporting for analyses using methods under SW-846 for testing soils and waters. ITS has reported that these irregularities involved the inappropriate manual integrations of chromatographic peak areas for the purpose of meeting method/protocol criteria[3]. Thus, all samples taken from the RMA by TechLaw in November 1997 and analyzed by ITS in November and December 1997 are suspect in Region 5's's eyes. In

[1] The laboratory that analyzed U.S. EPA samples taken from the RMA in November 1997.

[2] Formerly a part of A. T. Kearney, the contractor used by U.S. EPA to conduct the sampling in November 1997.

[3] The irregularities also involved samples from other clients besides U.S. EPA.

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addition, ITS "lost" several of the samples taken by TechLaw from the RMA.

U.S. EPA would also like to sample from several areas that were not sampled in November 1997. These areas include the sources of all materials (flyash, wastewater treatment sludge, etc.), being disposed of in the RMA, and the wells that had recently been installed around the RMA just prior to U.S. EPA's November 1997 sampling inspection. U.S. EPA is asking MPI to provide the exact location of all the wells, and the screened intervals, within 5 days of the receipt of this letter.

In addition, U.S. EPA is requesting MPI to advise the Agency within 5 days of the receipt of this letter as to whether or not it will accept responsibility for the characterization and proper disposal of all sampling/investigation derived wastes (IDW); including those generated by U.S. EPA and its contractor, as well as the Michigan Department of Environmental Quality (DEQ), and MPI (if DEQ and MPI elect to split sample with the U.S. EPA).

Once U.S. EPA receives MPI response to our request for well information, and whether or not MPI will handle the IDW, U.S. EPA will provide MPI with a draft sampling plan.

Enclosed are the draft analytical results of U.S. EPA's split samples from of the November 1997 sampling inspection. Please note that the U.S. EPA is currently attempting to make a determination on the validity of all sample analysis done by ITS. U.S. EPA is requesting that MPI provide the analytical results of MPI's split samples from the November 1997 sampling inspection immediately upon receipt of this letter.[4]

Please contact me if you have any questions regarding this sampling inspection, or concerns over granting U.S. EPA access to the MPI plant and the RMA. I can be reached at 312-886-6610.

Sincerely,

Deborah Garber

---

[4] U.S. EPA's request for information from MPI on the wells, and with regards to the analytical results of the November 1997 spilt sampling, is being made under Section 3007 of RCRA.

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

REPLY TO THE ATTENTION OF:
CS-13J

27 May 1998

CERTIFIED MAIL
RETURN RECEIPT REQUESTED and by
FACSIMILE

Steven Nadeau
Honigman Miller Schwartz and Cohn
2200 First National Building
660 Woodward Avenue
Detroit, Michigan 48226-3583

Dear Mr. Nadeau:

The United States Environmental Protection Agency (U.S. EPA), Region 5, will be conducting a sampling inspection, under the authority of the Resource Conservation and Recovery Act (RCRA), at the Manistique Paper, Incorporated (MPI), Residual Management Area (RMA), on June 8, 9, 10 and 11, 1998. As you are aware, U.S. EPA sampled the RMA in November 1997. However, U.S. EPA would like to sample the RMA once again.

As I explained to you in a previous telephone conversation, U.S. EPA has concerns with the analytical results reported by the laboratory who performed the analyses of the RMA samples. Intertek Testing Services (ITS)[1], of Richardson, Texas, a subcontractor laboratory to TechLaw, Inc., (TechLaw[2]), a U.S. EPA Contractor, recently notified U.S. EPA of irregularities in its data reporting for analyses using methods under SW-846 for testing soils and waters. These include analyses of VOCs and SVOCs. ITS has reported that these irregularities involved the inappropriate manual integrations of chromatographic peak areas for the purpose of meeting method/protocol criteria[3]. Thus, all samples taken from the RMA by TechLaw in November 1997 and analyzed by ITS in November and December 1997 are of questionable validity. In addition, ITS "lost" several of the samples taken by TechLaw from the RMA.

---

[1] The laboratory that analyzed U.S. EPA samples taken from the RMA in November 1997.

[2] Formerly a part of A. T. Kearney, the contractor used by U.S. EPA to conduct the sampling in November 1997.

[3] The irregularities also involved samples from other clients besides U.S. EPA.

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cc: Diane Sharrow, U.S. EPA
Todd Quillen, TechLaw
Hank Switzer, MDEQ

Enclosure

TABLE 3
ANALYTICAL RESULTS FOR WASTE PILE SAMPLES

Table 3-A: VOCs

Sample Number	SLG-1 (10-12)	SLG-2 (22-24)	SLG-3 (12-14)	SLG-4 (4-6)	SLG-5 (8-10)	SLG-35 (8-10)*
Units	mg/Kg	mg/Kg	mg/Kg	ug/Kg	ug/Kg	ug/Kg
Analyte	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q
1,1,1,2-Tetrachloroethane	12.8 U	12.4 U	9.07 U	1160 UD	1070 UD	1100 UD
1,1,1-Trichloroethane	12.8 U	12.4 U	9.07 U	1160 UD	1070 UD	1100 UD
1,1,2,2-Tetrachloroethane	12.8 UJ	12.4 U	9.07 R	1160 UD	1070 UD	1100 UD
1,1,2-Trichloroethane	12.8 U	12.4 U	9.07 U	1160 UD	1070 UD	1100 UD
1,1-Dichlorethane	12.8 U	12.4 U	9.07 U	1160 UD	1070 UD	1100 UD
1,1-Dichloroethene	12.8 U	12.4 U	9.07 U	1160 UD	1070 UD	1100 UD
1,1-Dichloropropene	12.8 U	12.4 U	9.07 U	1160 UD	1070 UD	1100 UD
1,2,3-Trichlorobenzene	12.8 UJ	12.4 U	9.07 R	1160 UD	1070 UD	**1830** D
1,2,3-Trichlorpropane	12.8 UJ	12.4 U	9.07 R	1160 UD	1070 UD	1100 UD
1,2,4-Trichlorobenzene	12.8 UJ	12.4 U	9.07 R	1160 UD	1070 UD	1100 UD
1,2,4-Trimethylbenzene	12.8 UJ	12.4 U	9.07 R	**2510** D	**48000** D	**2300** D
1,2-Dibromo-3-Chloropropane	64.2 UJ	62.1 U	45.4 R	5810 UD	5360 UD	5520 UD
1,2-Dibromoethane	12.8 U	12.4 U	9.07 U	1160 UD	1070 UD	1100 UD
1,2-Dichlorobenzene	12.8 UJ	12.4 U	9.07 R	1160 UD	1070 UD	1100 UD
1,2-Dichloroethane	12.8 U	12.4 U	9.07 U	1160 UD	1070 UD	1100 UD
1,2-Dichloropropane	12.8 U	12.4 U	9.07 U	1160 UD	1070 UD	1100 UD
1,3,5-Trimethylbenzene	12.8 UJ	12.4 U	9.07 R	**2320** D	**16600** D	**2450** D
1,3-Dichlorobenzene	12.8 U	12.4 U	9.07 U	1160 UD	1070 UD	1100 UD
1,3-Dichloropropane	12.8 U	12.4 U	9.07 U			
1,4-Dichlorobenzene	12.8 UJ	12.4 U	9.07 R	1160 UD	1070 UD	1100 UD
2,2-Dichloropropane	12.8 U	12.4 U	9.07 U	1160 UD	1070 UD	1100 UD
2-Butanone	257 UJ	248 UJ	**83** J	23200 UD	21500 UD	22100 UD
2-Chlorotoluene	12.8 UJ	12.4 U	9.07 R	2320 UDJ	2150 UDJ	2210 UDJ
2-Chloroethylvinyether	25.7 UJ	24.8 UJ	18.1 UJ	1160 UD	1070 UD	1100 UD
2-Hexanone	128 U	124.0 U	90.7 U	11600 UD	10700 UD	11000 UD
4-Chlorotoluene	13 UJ	12.4 U	9.07 R	1160 UD	1070 UD	1100 UD
4-Methyl-2-pentanone	257 U	248.0 U	181 U	23200 UD	21500 UD	22100 UD
Acetone	90 UJ	49.3 UJ	**276** J	**6900** DJ	**6410** DJ	**5870** DJ
Acrylonitrile	13 UJ	12.4 UR	9.07 R	1160 R	1070 R	1100 R
Benzene	13 U	12.4 U	9.07 U	1160 UD	1070 UD	1100 UD
Bromobenzene	13 UJ	12.4 U	9.07 R	1160 UD	1070 UD	1100 UD
Bromochloromethane	13 U	12.4 U	9.07 U	1160 UD	1070 UD	1100 UD
Bromodichloromethane	13 U	12.4 U	9.07 U	1160 UD	1070 UD	1100 UD
Bromoform	13 U	12.4 U	9.07 U	1160 UD	1070 UD	1100 UD
Bromomethane	13 U	12.4 U	9.07 U	1160 UD	1070 UD	1100 UD
Carbon disulfide	13 U	12.4 U	9.07 U	1160 UD	1070 UD	1100 UD
Carbon tetrachloride	13 U	12.4 U	9.07 U	1160 UD	1070 UD	1100 UD
Chlorobenzene	13 U	12.4 U	9.07 U	1160 UD	1070 UD	1100 UD
Chloroethane	13 U	12.4 U	9.07 U	1160 UD	1070 UD	1100 UD
Chloroform	13 U	12.4 U	9.07 U	1160 UD	1070 UD	1100 UD
Chloromethane	13 U	12.4 U	9.07 U	1160 UD	1070 UD	1100 UD
Dibromochloromethane	13 U	12.4 U	9.07 U	1160 UD	1070 UD	1100 UD
Dibromomethane	13 U	12.4 U	9.07 U	1160 UD	1070 UD	1100 UD
Ethylbenzene	13 U	12.4 U	9.07 U	1160 UD	**3260** D	1100 UD
Iodomethane	13 U	12.4 U	9.07 U	1160 UD	1070 UD	1100 UD
Methylene Chloride	13 U	20.6 U	9.07 U	1160 UD	1070 UD	1100 UD
Styrene	13 U	12.4 U	9.07 U	1160 UD	1070 UD	1100 UD
Tetrachloroethene	13 U	12.4 U	9.07 U	1160 UD	1070 UD	1100 UD
Toluene	13 U	12.4 U	**211** J	**1180** D	**3050** D	**1250** D
Trichloroethene	13 U	12.4 U	9.07 U	1160 UD	1070 UD	1100 UD

Table 3-A: VOCs

Sample Number	SLG-1 (10-12)		SLG-2 (22-24)		SLG-3 (12-14)		SLG-4 (4-6)		SLG-5 (8-10)		SLG-35 (8-10)*	
Units	mg/Kg		mg/Kg		mg/Kg		ug/Kg		ug/Kg		ug/Kg	
Analyte	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Trichlorofluoromethane	13	U	12.4	U	9.07	U	1160	UD	1070	UD	1100	UD
Vinyl acetate	128	U	124	U	90.7	U	1160	UDJ	1070	UDJ	1100	UDJ
Vinyl Chloride	13	U	12.4	U	9.07	U	465	UD	429	UD	442	UD
cis-1,2-Dichloroethene	13	U	12.4	U	9.07	U	1160	UD	1070	UD	1100	UD
cis-1,3-Dichloropropene	13	U	12.4	U	9.07	U	1160	UD	1070	UD	1100	UD
m+p-Xylene	13	U	12.4	U	9.07	U	1160	UD	**11600**	D	1100	UD
o-Xylene	13	U	12.4	U	9.07	U	1160	UD	**5190**	D	1100	UD
trans-1,2-Dichloroethene	13	U	12.4	U	9.07	U	1160	UD	1070	UD	1100	UD
trans-1,3-Dichloropropene	13	U	12.4	U	9.07	U	1160	UD	1070	UD	1100	UD
trans-1,4-Dichloro-2-butene	257	R	248	R	181	R	23200	R	21500	R	22100	R

*SLG-35 8-10 is a field duplicate of SLG-5 8-10

TABLE 3
ANALYTICAL RESULTS FOR WASTE PILE SAMPLES

Table 3-B: SVOCs

Sample Number	SLG-1 (10-12)		SLG-2 (22-24)		SLG-3 (12-14)		SLG-4 (4-6)		SLG-5 (8-10)		SLG-35 8-10*		WST-1	
Units	ug/Kg		ug/Kg		ug/Kg		ug/Kg		ug/Kg		ug/Kg		ug/Kg	
Analyte	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
1,2-Dichlorobenzene	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
1,3-Dichlorobenzene	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
1,4-Dichlorobenzene	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
1,2,4-Trichlorobenzene	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
2,4,5-Trichlorophenol	41.30	UD	41,000	UD	29,500	UD	76,700	UD	14,200	UD	71,400	UD	33,000	UDJ
2,4,6-Trichlorophenol	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
2,4-Dichlorophenol	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
2,4-Dimethylphenol	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
2,4-Dinitrophenol	41,300	UD	41,000	UD	29,500	UD	76,700	UD	14,200	UD	71,400	UD	33,000	UDJ
2,4-Dinitrotoluene	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
2,6-Dinitrotolune	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
2-Chloronaphthalene	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
2-Chlorophenol	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
2-Methylnaphthalene	8,250	UD	**4,770**	**JD**	5,900	UD	15,300	UD	**40,800**	**D**	8,350	JD	6,600	UDJ
2-Methylphenol	**8,060**	**JD**	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
2-Nitroanaline	41,300	UD	41,000	UD	29,500	UD	76,700	UD	70,800	UD	71,400	UD	33,000	UDJ
2-Nitrophenol	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
3,3'-Dichlorobenzidine	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	13,000	UDJ
3-Nitroanaline	41,300	UD	41,000	UD	29,500	UD	76,700	UD	70,800	UD	71,400	UD	33,000	UDJ
4,6-Ditnitro-2-methylphenol	41,300	UD	41,000	UD	29,500	UD	76,700	UD	70,800	UD	71,400	UD	33,000	UDJ
4-Bromophenyl Phenyl Ether	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
4-Chloro-3-methylphenol	8,250	UD	8,190	UD	5,900	UD	30,200	UD	27,900	UD	28,100	UD	13,000	UDJ
4-Chloroanaline	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	13,000	UDJ
4-Chlorophenyl Phenyl Ether	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
4-Methylphenol	**6,990**	**JD**	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
4-Nitroanaline	41,300	UD	41,000	UD	29,500	UD	76,700	UD	70,800	UD	71,400	UD	33,000	UDJ
4-Nitrophenol	41,300	UD	41,000	UD	14,300	UD	37,200	UD	34,300	UD	34,700	UD	16,000	UDJ
Acenaphthene	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
Acenaphthylene	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
Anthracene	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
Benzo(a)Anthracene	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
Benzo(a)Pyrene	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
Benzo(b)Fluoranthene	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
Benzo(g,h,i)Perylene	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
Benzo(k)Fluoranthene	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ

Table 3-B: SVOCs

Sample Number	SLG-1 (10-12)		SLG-2 (22-24)		SLG-3 (12-14)		SLG-4 (4-6)		SLG-5 (8-10)		SLG-35 8-10*		WST-1	
Units	ug/Kg		ug/Kg		ug/Kg		ug/Kg		ug/Kg		ug/Kg		ug/Kg	
Analyte	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Benzoic acid	41,300	UD	41,000	UD	29,500	UD	37,200	UD	34,300	UD	34,700	UD	16,000	UDJ
Benzyl Alcohol	16,300	UD	16,100	UD	11,600	UD	30,200	UD	27,900	UD	28,100	UD	13,000	UDJ
Bis(2-Chloroethyl)ether	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
Bis(2-Chloroisopropyl)ether	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
Bis(2-chloroethoxy)methane	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
Bis(2-ethylhexyl)phthalate	8,250	UD	8,190	UD	5,900	UD	15,300	UD	8,000	JD	14,300	UD	6,600	UDJ
Butyl Benzyl Phthalate	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
Carbazole	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
Chrysene	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
Di-n-Butyl Phthalate	8,250	UD	8,190	JD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
Di-n-octylphthalate	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
Dibenzo(a,h)Anthracene	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
Dibenzofuran	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
Diethyl Phthalate	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
Dimethyl Phthalate	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
Fluoranthene	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
Fluorene	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
Hexachlorobenzene	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
Hexachlorobutadiene	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
Hexachlorocyclopentadiene	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
Hexachloroethane	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
Indeno(1,2,3-CD)Pyrene	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
Isophorone	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
N-Nitroso-di-n-propylamine	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
N-Nitrosodiphenylamine	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
Naphthalene	8,250	UD	8,190	UD	5,900	UD	15,300	UD	10,800	JD	14,300	UD	6,600	UDJ
Nitrobenzene	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
Pentachlorophenol	41,300	UD	41,000	UD	29,500	UD	76,700	UD	70,800	UD	71,400	UD	33,000	UDJ
Phenanthrene	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
Phenol	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
Pyrene	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ

*SLG-35 8-10 is a field duplicate of SLG-5 8-10

TABLE 3
ANALYTICAL RESULTS FOR WASTE PILE SAMPLES

Table 3-C: PCBs

Sample Number	SLG-1 (24-26)		SLG-2 (16-18)		SLG-3 (18-20)		SLG-4 (16-18)		SLG-5 (16-18)		WST-1		SLG-35 16-18*	
Units	ug/Kg		ug/Kg		ug/Kg		ug/Kg		ug/Kg		ug/Kg		ug/Kg	
Analyte	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Aroclor 1016	282	U	295	U	195	U	164	U	98.7	U	121	U	107	U
Aroclor 1221	282	U	295	U	195	U	164	U	98.7	U	121	U	107	U
Aroclor 1232	282	U	295	U	195	U	164	U	98.7	U	121	U	107	U
Aroclor 1242	282	U	295	U	195	U	164	U	98.7	U	121	U	107	U
Aroclor 1248	282	U	295	U	195	U	164	U	98.7	U	121	U	107	U
Aroclor 1254	282	U	295	U	195	U	164	U	98.7	U	121	U	107	U
Aroclor 1260	282	U	295	U	195	U	164	U	98.7	U	121	U	107	U

*SLG-35 16-18 is a field duplicate of SLG-5 16-18

TABLE 3
ANALYTICAL RESULTS FOR WASTE PILE SAMPLES

Table 3-D: Appendix IX Metals

Sample Number	SLG-1 (10-12)	SLG-1 (24-26)	SLG-2 (16-18)	SLG-32 (16-18)*	SLG-2 (22-24)	SLG-3 (12-14)	SLG-3 (18-20)	SLG-4 (4-6)	SLG-4 (16-18)	SLG-5 (8-10)	SLG-5 (16-18)	WST-1
Units	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
Analyte	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q
Antimony	2.60 UJ	2.80 UJ	2.90 UJ	3.10 UJ	2.50 UJ	1.80 UJ	2.00 UJ	2.30 UJ	3.30 UJ	2.10 UJ	2.00 UJ	2.40 UJ
Arsenic	2.50	3.60	0.51	1.50 U	0.97	1.60	1.4	21.7	1.60 U	1.40	4.40	1.20 U
Barium	107	248	65.3	63.6	96.30	57.60	46.1	214	111	36.7	70	31.90
Beryllium	0.29	0.54	0.29 U	0.31 U	0.24 U	0.17	0.19 U	2.3	0.44 U	0.38	0.82	0.25
Cadmium	0.51 U	0.57 U	0.59 U	0.62 U	0.49 U	0.36 U	0.39 U	0.46 U	0.65 U	0.43 U	0.39 U	0.48 U
Chromium	12.5	37.4	9.70	9.20	32.50	11.40	8.5	10.8	7.8	9.2	5.60	5.20
Cobalt	1.90	3.00	1.18 U	1.20 U	1.40	0.96	0.74	5.7	1.30 U	1.00	1.90	1.00 U
Copper	50.6	42.9	43.4	41.4	69.1	30.60	25.4	60.5	73.2	69.8	41.9	103
Lead	34.0	163	33.3	29.8	125	47.00	35.1	12.1	5.00	3.00	2.50	3.50
Mercury	0.088 U	0.096 U	0.101 U	0.105 U	0.085	0.096	0.0688	0.0836	0.112 U	0.0734 U	0.0669 U	0.0827 U
Nickel	4.00	5.80	1.47 U	0.73 U	2.30	2.50	2.2	10.4 J	**2.00 J	2.6 J	4.1 J	1.40 J
Selenium	1.54 U	1.69 U	1.77 U	1.85 U	1.49 U	1.09 U	1.17 U	1.80 B	1.96 U	1.29 U	1.17 U	1.45 U
Silver	1.03 U	1.13 U	1.18 U	2.77 U	0.99 U	0.73 U	0.78 U	0.93 U	1.31 U	0.86 U	0.78 U	0.97 U
Thallium	2.31 U	2.55 U	2.65 U	9.80 U	2.23 U	1.63 U	1.76 U	2.09 U	2.94 U	1.93 U	1.76 U	2.18 U
Vanadium	17.7	14.2	9.90	60.4	14.3	7.40	6.1	25.7	12.8	13.0	11.1	9.3
Zinc	59.7	52.5	122	57.0	239	65.9	49.7	43.8	91.3	62.9	42.7	37.40
Titanium	92.0 J	125.00 J	52.0 J	4.00 J	62.0 J	64 J	60 J	256 J	79 J	65.00 J	91 J	75 J
Tin	4.10	4.20	4.00	4.00 U	4.50	2.30	3.6	2.6	2.60	2.00	1.50	2.20

*SLG-32 16-18 is a field duplicate of SLG-2 16-18
*SLG-35 8-10 " " " SLG-5 8-10
*SLG-35 16-18 " " " SLG-5 16-18

Table 3-E: Total Sulfides

Sample Number	SLG-1 (10-12)	SLG-1 (24-26)	SLG-2 (16-18)	SLG-32 (16-18)*	SLG-2 (22-24)	SLG-3 (12-14)	SLG-3 (18-20)	SLG-4 (4-6)	SLG-4 (16-18)	SLG-5 (8-10)	SLG-5 (16-18)	WST-1
Units	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
Analyte	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q
Sulfide, Total	25.7 U	28.3 U	29.5 U	30.8 U	24.8 U	18.1 U	19.5 U	23.2 U	32.6 U	21.5 U	19.6 U	24.2 U

*SLG-32 16-18 is a field duplicate of SLG-2 16-18

Table 3-F: TCLP Metals

Sample Number	SLG-1 (2-4)	SLG-2 (0-2)	SLG-3 (24-26)	SLG-33 (24-26)*	SLG-4 (12-14)	SLG-5 (14-16)
Units	Mg/L	Mg/L	Mg/L	Mg/L	mg/L	mg/L
Analyte	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q
Arsenic	0.05 U	0.05 U	0.05 U	0.05 U	0.0500 U	0.0500 U
Barium	0.61	0.70	0.57	0.48	0.56	0.47
Cadmium	0.003 U	0.003 U	0.003 U	0.003 U	0.0030 U	0.0030 U
Chromium	0.005 U	0.006 B	0.005 U	0.005 U	0.0058	0.0055
Lead	0.05 U	0.05 U	0.059	0.059	0.0500 U	0.0500 U
Mercury	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U
Selenium	0.01 U	0.01 U	0.01 U	0.01 U	0.0100 U	0.0100 U
Silver	0.005 U	0.005 U	0.005 U	0.005 U	0.0050 U	0.0050 U

*SLG-33 24-26 is a field duplicate of SLG-3 24-26

TABLE 4
ANALYTICAL RESULTS FOR SOIL SAMPLES

Table 4-A: SVOCs

Sample Number	SS-1		SS-2	
Units	ug/Kg		ug/Kg	
Analyte	Result	Q	Result	Q
1,2-Dichlorobenzene	13,900	UD	102,000	UD
1,3-Dichlorobenzene	13,900	UD	102,000	UD
1,4-Dichlorobenzene	13,900	UD	102,000	UD
1,2,4-Trichlorobenzene	13,900	UD	102,000	UD
2,4,5-Trichlorophenol	69,400	UD	509,000	UD
2,4,6-Trichlorophenol	13,900	UD	102,000	UD
2,4-Dichlorophenol	13,900	UD	102,000	UD
2,4-Dimethylphenol	13,900	UD	102,000	UD
2,4-Dinitrophenol	69,400	UD	509,000	UD
2,4-Dinitrotoluene	13,900	UD	102,000	UD
2,6-Dinitrotoluene	13,900	UD	102,000	UD
2-Chloronaphthalene	13,900	UD	102,000	UD
2-Chlorophenol	13,900	UD	102,000	UD
2-Methylnaphthalene	13,900	UD	102,000	UD
2-Methylphenol	13,900	UD	102,000	UD
2-Nitroaniline	69,400	UD	509,000	UD
2-Nitrophenol	13,900	UD	102,000	UD
3,3'-Dichlorobenzidine	13,900	UD	102,000	UD
3-Nitroaniline	69,400	UD	509,000	UD
4,6-Dinitro-2-methylphenol	69,400	UD	509,000	UD
4-Bromophenyl phenyl ether	13,900	UD	102,000	UD
4-Chloro-3-methylphenol	27,300	UD	200,000	UD
4-Chloroanaline	13,900	UD	102,000	UD
4-Chlorophenyl phenyl ether	13,900	UD	102,000	UD
4-Methylphenol	13,900	UD	102,000	UD
4-Nitroaniline	69,400	UD	509,000	UD
4-Nitrophenol	13,900	UD	247,000	UD
Acenaphthene	13,900	UD	102,000	UD
Acenaphthylene	13,900	UD	102,000	UD
Anthracene	13,900	UD	102,000	UD
Benzo(a)anthracene	13,900	UD	102,000	UD
Benzo(a)pyrene	13,900	UD	102,000	UD
Benzo(b)fluoranthene	13,900	UD	102,000	UD
Benzo(g,h,i)perylene	13,900	UD	102,000	UD
Benzo(k)fluoranthene	13,900	UD	102,000	UD
Benzoic acid	33,600	UD	247,000	UD
Benzyl alcohol	27,300	UD	200,000	UD
Bis(2-chloroethoxy)methane	13,900	UD	102,000	UD
Bis(2-Chloroethyl)ether	13,900	UD	102,000	UD
Bis(2-Chloroisopropyl)ether	13,900	UDJ	102,000	UDJ

Table 4-A: SVOCs

Sample Number	SS-1	SS-2
Units	ug/Kg	ug/Kg
Analyte	Result Q	Result Q
Bis(2-ethylhexyl)phthalate	13,900 UD	102,000 UD
Butyl benzyl phthalate	13,900 UD	102,000 UD
Carbazole	13,900 UD	102,000 UD
Chrysene	13,900 UD	102,000 UD
Di-n-butyl phthalate	13,900 UD	102,000 UD
Di-n-octylphthalate	13,900 UD	102,000 UD
Dibenz(a,h) anthracene	13,900 UD	102,000 UD
Dibenzofuran	13,900 UD	102,000 UD
Diethyl phthalate	13,900 UD	102,000 UD
Dimethyl phthalate	13,900 UD	102,000 UD
Fluoranthene	13,900 UD	102,000 UD
Fluorene	13,900 UD	102,000 UD
Hexachlorobenzene	13,900 UD	102,000 UD
Hexachlorobutadiene	13,900 UD	102,000 UD
Hexachlorocyclopentadiene	13,900 UD	102,000 UD
Hexachloroethane	13,900 UD	102,000 UD
Indeno(1,2,3-CD)pyrene	13,900 UD	102,000 UD
Isophorone	13,900 UD	102,000 UD
N-Nitrosodi-n-propylamine	13,900 UD	102,000 UD
N-Nitrosodiphenylamine	13,900 UD	102,000 UD
Naphthalene	13,900 UD	102,000 UD
Nitrobenzene	13,900 UD	102,000 UD
Pentachlorophenol	69,400 UD	509,000 UD
Phenanthrene	13,900 UD	102,000 UD
Phenol	13,900 UD	102,000 UD
Pyrene	13,900 UD	102,000 UD

Table 4-B: PCBs

Sample Number	SS-1	SS-2
Units	ug/kg	ug/kg
Analyte	Result Q	Result Q
Aroclor 1016	213 U	154 U
Aroclor 1221	213 U	154 U
Aroclor 1232	213 U	154 U
Aroclor 1242	213 U	154 U
Aroclor 1248	213 U	154 U
Aroclor 1254	213 U	154 U
Aroclor 1260	213 U	154 U

TABLE 4
ANALYTICAL RESULTS FOR SOIL SAMPLES

Table 4-D: Appendix IX Metals

Sample Number	SS-1	SS-2
Units	mg/Kg	mg/Kg
Analyte	Result Q	Result Q
Antimony	4.30 UJ	3.10 UJ
Arsenic	5.20	9.60
Barium	355	84.7
Beryllium	1.20	1.50
Cadmium	0.92	**0.62 U**
Chromium	32.7	22.8
Cobalt	4.20	2.80
Copper	20.6	9.70
Lead	28.7	16.2
Mercury	**0.146 U**	0.187
Nickel	4.60 J	3.10 J
Selenium	**2.55 U**	**1.85 U**
Silver	**1.70 U**	**1.23 U**
Thallium	**3.83 U**	**2.78 U**
Vanadium	31.9	123
Zinc	179	44.5
Titanium	65.0 J	338 J
Tin	3.40	2.50

TABLE 5
ANALYTICAL RESULTS FOR SURFACE WATER AND SEDIMENT SAMPLES

Table 5-A: Surface Water VOCs

Sample Number	SW-1	SW-2	SW-3	SW-4	SW-5	SW-6	SW-7	SW-8	SW-10*
Units	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Analyte	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q
1,1,1,2-Tetrachloroethane	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
1,1,1-Trichloroethane	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
1,1,2,2-Tetrachloroethane	5.00 U	5.00 U	5.00 UJ	5.00 UJ	5.00 UJ	5.00 UJ	5.00 UJ	5.00 UJ	5.00 UJ
1,1,2-Trichloroethane	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
1,1-Dichlorethane	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
1,1-Dichloroethene	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
1,1-Dichloropropene	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
1,2,3-Trichlorobenzene	5.00 U	5.00 U	5.00 UJ	5.00 UJ	5.00 UJ	5.00 UJ	5.00 UJ	5.00 UJ	5.00 UJ
1,2,3-Trichloropropane	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
1,2,4-Trichlorobenzene	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
1,2,4-Trimethylbenzene	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
1,2-Dibromo-3-Chloropropane	25.0 U	25.0 U	25.0 UJ	25.0 UJ	25.0 UJ	25.0 UJ	25.0 UJ	25.0 UJ	25.0 UJ
1,2-Dibromoethane	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
1,2-Dichlorobenzene	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
1,2-Dichloroethane	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
1,2-Dichloropropane	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
1,3,5-Trimethylbenzene	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
1,3-Dichlorobenzene	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
1,3-Dichloropropane	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
1,4-Dichlorobenzene	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
2,2-Dichloropropane	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
2-Butanone	100 U	100 U	100 UJ	100 UJ	100 UJ	100 UJ	100 UJ	100 UJ	100 UJ
2-Chlorotoluene	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
2-Chloroethylvinyether	10.0 U	10.0 U	10.0 UJ	10.0 U	10.0 U	10.0 U	10.0 U	10.0 UJ	10.0 U
2-Hexanone	50.0 U	50.0 U	50.0 UJ	50.0 UJ	50.0 UJ	50.0 UJ	50.0 UJ	50.0 UJ	50.0 UJ
4-Chlorotoluene	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
4-Methyl-2-pentanone	100 U	100 U	100 UJ	100 U	100 U	100 U	100 U	100 UJ	100 U
Acetone	20.0 U	20.0 U	20.0 R	20.0 R	20.0 R	20.0 R	20.0 R	20.0 R	20.0 R
Acrylonitrile	5.00 R	5.00 R	5.00 R	5.00 R	5.00 R	5.00 R	5.00 R	5.00 R	5.00 R
Benzene	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
Bromobenzene	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
Bromochloromethane	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
Bromodichloromethane	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
Bromoform	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
Bromomethane	5.00 UJ	5.00 UJ	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
Carbon disulfide	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
Carbon tetrachloride	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
Chlorobenzene	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
Chloroethane	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
Chloroform	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
Chloromethane	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
Dibromochloromethane	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
Dibromomethane	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
Ethylbenzene	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U

Table 5-A: Surface Water VOCs

Sample Number	SW-1		SW-2		SW-3		SW-4		SW-5		SW-6		SW-7		SW-8		SW-10*	
Units	ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L	
Analyte	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
1,1,1,2-Tetrachloroethane	5.00	U	5.00	U	5.00	UJ	5.00	U	5.00	U	5.00	U	5.00	U	5.00	UJ	5.00	U
Iodomethane	5.00	UJ	5.00	UJ	5.00	UJ	5.00	UJ	5.00	UJ	5.00	UJ	5.00	UJ	5.00	UJ	5.00	UJ
Methylene Chloride	5.00	U	5.00	U	5.00	UJ	5.00	U	5.00	U	5.00	U	5.00	U	5.00	UJ	5.00	U
Styrene	5.00	U	5.00	U	5.00	UJ	5.00	U	5.00	U	5.00	U	5.00	U	5.00	UJ	5.00	U
Tetrachloroethene	5.00	U	5.00	U	5.00	UJ	5.00	U	5.00	U	5.00	U	5.00	U	5.00	UJ	5.00	U
Toluene	5.00	U	5.00	U	5.00	UJ	**15.4**		5.00	U	5.00	U	5.00	U	5.00	UJ	5.00	U
Trichloroethene	5.00	U	5.00	U	5.00	UJ	5.00	U	5.00	U	5.00	U	5.00	U	5.00	UJ	5.00	U
Trichlorofluoromethane	5.00	U	5.00	U	5.00	UJ	5.00	U	5.00	U	5.00	U	5.00	U	5.00	UJ	5.00	U
Vinyl acetate	50.0	U	50.0	U	50.0	UJ	50.0	U	50.0	U	50.0	U	50.0	U	50.0	UJ	50.0	U
Vinyl Chloride	2.00	U	2.00	U	2.00	UJ	2.00	U	2.00	U	2.00	U	2.00	U	2.00	UJ	2.00	U
cis-1,2-Dichloroethene	5.00	U	5.00	U	5.00	UJ	5.00	U	5.00	U	5.00	U	5.00	U	5.00	UJ	5.00	U
cis-1,3-Dichloropropene	5.00	U	5.00	U	5.00	UJ	5.00	U	5.00	U	5.00	U	5.00	U	5.00	UJ	5.00	U
m+p-Xylene	5.00	U	5.00	U	5.00	UJ	5.00	U	5.00	U	5.00	U	5.00	U	5.00	UJ	5.00	U
o-Xylene	5.00	U	5.00	U	5.00	UJ	5.00	U	5.00	U	5.00	U	5.00	U	5.00	UJ	5.00	U
trans-1,2-Dichloroethene	5.00	U	5.00	U	5.00	UJ	5.00	U	5.00	U	5.00	U	5.00	U	5.00	UJ	5.00	U
trans-1,3-Dichloropropene	5.00	U	5.00	U	5.00	UJ	5.00	U	5.00	U	5.00	U	5.00	U	5.00	UJ	5.00	U
trans-1,4-Dichloro-2-butene	100	UJ	100	UJ	100	UJ	100	U	100	U	100	U	100	U	100	UJ	100	U

*SW-10 is a field duplicate of SW-5

TABLE 5
ANALYTICAL RESULTS FOR SURFACE WATER AND SEDIMENT SAMPLES

Table 5-B: Surface Water Appendix IX Metals and Titanium

Sample Number	SW-1	SW-2	SW-4	SW-5	SW-6	SW-7	SW-10*	EB-01**
Analyte	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q
Units	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Antimony	30.0 U	30.0 U	30.0 U	30.0 U	30.0 U	30.0 U	30.0 U	30.0 U
Arsenic								
Barium	13.3	29.2	390	52.8	177	81.6	51.9	3.0 U
Beryllium	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Cadmium	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Chromium	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Cobalt	2.0 U	2.0 U	39.3	2.0 U	3.9 B	10.2	2.0 U	2.0 U
Copper	4.0 U	4.0 U	8.5 B	4.2 B	7.1 B	8.6 B	4.0 U	4.0 U
Lead	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	6.8	5.0 U	5.0 U
Mercury	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Nickel	6.4	7.3	53.4	4.1 B	14.6	26.0	5.8	4.0 U
Selenium	6.0 U	6.0 U	6.0 U	6.0 U	6.0 U	6.0 U	6.0 U	6.0 U
Silver	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Thallium	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U
Vanadium	3.0 U	3.0 U	3.5 B	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U
Zinc	19.0 U	19.0 U	19.0 U	19.0 U	19.0 U	19.0 U	20.4	19.0 U
Tin	2.0 UJ	2.0 UJ	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U
Titanium	4.0 U	4.0 U	7.0	2.0 U	2.0 U	16.0	2.0 U	2.0 U

*SW-10 is a field duplicate of SW-5

**EB-01 is an equipment blank for equipment used to collect Sediment samples

Table 5-B: Surface Water Sulfides

Sample Number	SW-1	SW-2	SW-3	SW-4	SW-5	SW-6	SW-7	SW-8	SW-10*
Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Analyte	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q
Sulfide, Total	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U

*SW-10 is a field duplicate of SW-5

TABLE 5
ANALYTICAL RESULTS FOR SURFACE WATER AND SEDIMENT SAMPLES

Table5-C: SVOCs

Sample Number	SED-1		SED-2		SED-3		SED-4		SED-5		SED-6		SED-7		SED-8		SED-10*		EB-01**	
Units	mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		ug/L	
Analyte	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
1,2-Dichlorobenzene	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
1,3-Dichlorobenzene	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
1,4-Dichlorobenzene	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
1,2,4-Trichlorobenzene	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
2,4,5-Trichlorophenol	48,400	U	25,600	U	13,200	U	17,900	U	7,700	U	9,120	U	95,500	U	7,800	U	8,470	U	10,000	U
2,4,6-Trichlorophenol	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
2,4-Dichlorophenol	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
2,4-Dimethylphenol	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
2,4-Dinitrophenol	48,400	U	25,600	U	13,200	U	17,900	UJ	7,700	UJ	9,120	U	95,500	U	7,800	U	8,470	UJ	50,000	U
2,4-Dinitrotoluene	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
2,6-Dinitrotoluene	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
2-Chloronaphthalene	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
2-Chlorophenol	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
2-Methylnaphthalene	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
2-Methylphenol	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
2-Nitroanaline	48,400	U	25,600	U	13,200	U	17,900	U	7,700	U	9,120	U	95,500	U	7,800	U	8,470	U	50,000	U
2-Nitrophenol	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
3,3'-Dichlorobenzidine	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	20,000	U
3-Nitroanaline	48,400	U	25,600	U	13,200	U	17,900	U	7,700	U	9,120	U	95,500	U	7,800	U	8,470	U	50,000	U
4,6-Dinitro-2-methylphenol	48,400	U	25,600	U	13,200	U	17,900	U	7,700	U	9,120	U	95,500	U	7,800	U	8,470	U	50,000	U
4-Bromophenyl Phenyl Ether	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
4-Chloro-3-methylphenol	19,100	U	10,100	U	5,210	U	7,070	U	3,030	U	3,590	U	37,600	U	3,070	U	3,340	U	20,000	U
4-Chloroanaline	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	20,000	U
4-Chlorophenyl Phenyl Ether	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
4-Methylphenol	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
4-Nitroanaline	48,400	U	25,600	U	13,200	U	17,900	UJ	7,700	UJ	9,120	U	95,500	U	7,800	U	8,470	UJ	50,000	U
4-Nitrophenol	23,500	U	12,400	U	6,410	U	8,700	U	3,740	U	4,420	U	46,300	U	3,780	U	4,110	U	50,000	U
Acenaphthene	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
Acenaphthylene	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
Anthracene	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
Benzo(a)Anthracene	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
Benzo(a)Pyrene	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
Benzo(b)Fluoranthene	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
Benzo(g,h,i)Perylene	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
Benzo(k)Fluoranthene	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
Benzoic acid	23,500	U	12,400	U	6,410	U	8,700	U	3,740	U	4,420	U	95,500	U	3,780	U	4,110	U	50,000	UJ
Benzyl Alcohol	19,100	U	10,100	U	5,210	U	7,070	U	3,030	U	3,590	U	37,600	U	3,070	U	3,340	U	20,000	U
Bis(2-Chloroethyl)ether	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	UJ

Table5-C: SVOCs

Sample Number	SED-1		SED-2		SED-3		SED-4		SED-5		SED-6		SED-7		SED-8		SED-10*		EB-01**	
Units	mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		ug/L	
Analyte	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Bis(2-Chloroisopropyl)ether	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
Bis(2-chloroethoxy)methane	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
Bis(2-ethylhexyl)phthalate	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
Butyl Benzyl Phthalate	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
Carbazole	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
Chrysene	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
Di-n-Butyl Phthalate	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
Di-n-octylphthalate	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
Dibenzo(a,h)Anthracene	9,690	UJ	5,120	UJ	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
Dibenzofuran	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
Diethyl Phthalate	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
Dimethyl Phthalate	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
Fluoranthene	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
Fluorene	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
Hexachlorobenzene	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
Hexachlorobutadiene	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
Hexachlorocyclopentadiene	9,690	U	5,120	U	2,650	U	3,590	UJ	1,540	UJ	1,820	U	1,910	U	1,560	U	1,690	UJ	10,000	U
Hexachloroethane	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
Indeno(1,2,3-CD)Pyrene	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
Isophorone	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
N-Nitroso-di-n-propylamine	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	UJ
N-Nitrosodiphenylamine	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
Naphthalene	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
Nitrobenzene	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
Pentachlorophenol	48,400	U	25,600	U	13,200	U	17,900	U	7,700	U	9,120	U	95,500	U	7,800	U	8,470	U	50,000	U
Phenanthrene	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
Phenol	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
Pyrene	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U

*SED-10 is a field duplicate of SED-5

**EB-01 is an equipment blank ifor equipment used to collect Sediment samples

TABLE 5
ANALYTICAL RESULTS FOR SURFACE WATER AND SEDIMENT SAMPLES

Table 5-D: PCBs

Sample Number	SED-1	SED-2	SED-3	SED-4	SED-5	SED-6	SED-7	SED-8	SED-10	EB-1**
Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/L
Analyte	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q
Aroclor 1016	245 U	259 U	802 U	1088 U	490 U	550 U	580 U	473 U	514 U	0.650 U
Aroclor 1221	245 U	259 U	802 U	1088 U	490 U	550 U	580 U	473 U	514 U	0.650 U
Aroclor 1232	245 U	259 U	802 U	1088 U	490 U	550 U	580 U	473 U	514 U	0.650 U
Aroclor 1242	245 U	259 U	802 U	1088 U	490 U	550 U	580 U	473 U	514 U	0.650 U
Aroclor 1248	245 U	259 U	802 U	1088 U	490 U	550 U	580 U	473 U	514 U	0.650 U
Aroclor 1254	245 U	259 U	802 U	1088 U	490 U	550 U	580 U	473 U	514 U	0.650 U
Aroclor 1260	245 U	259 U	802 U	1088 U	490 U	550 U	580 U	473 U	514 U	0.650 U

Note: all Reporting limits for the soil samples were corrected by a factor of times 2 to reflect the reporting limt from the blank.
** EB-01 is an equipment blank for equipment used to collect Sediment samples

Table 5-E: Appendix IX and Titanium

Sample Number	SED-1	SED-2	SED-3	SED-4	SED-5	SED-6	SED-7	SED-8	SED-10*
Analyte	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q
Units	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
Antimony	4.90 UJ	5.20 UJ	2.7 R	1.8 U	1.6 U	1.8 U	1.9 U	1.6 UR	1.7 U
Arsenic	2.40 U	2.60 U	**2.9**	**1.4**	0.8 U	0.9 U	**2.1**	0.8 U	0.9 U
Barium	**20.8**	**28.9**	**35.3 J**	**36.6 J**	**14.4 J**	**10.2 J**	**91.4 J**	**14.1 J**	**12.0 J**
Beryllium	**0.52**	**0.53**	**0.33**	0.18 U	0.16 U	0.18 U	0.19 U	0.16 U	0.17 U
Cadmium	0.98 U	1.04 U	0.53 U	0.36 U	0.33 U	0.37 U	0.39 U	0.32 U	0.34 U
Chromium	**5.20**	**5.90**	**6.9**	**5.9 J**	**1.9 J**	**2.4 J**	**7.1 J**	**2.7**	**1.9 J**
Cobalt	2.00 U	2.10 U	**2.5**	0.7 U	0.7 U	0.7 U	**2.1**	0.6 U	0.7 U
Copper	**7.20**	**6.30**	**5.6**	**2.0**	**1.4**	**4.0**	**3.7**	**1.2**	**1.0**
Lead	**5.40**	**9.10**	**7.9**	**5.7**	**5.8**	**7.4**	**6.1**	**3.2**	**5.0**
Mercury	0.167 U	0.177 U	0.091 U	**0.174**	0.0558 U	0.063 U	0.066 U	0.0539 U	0.059 U
Nickel	**4.90 J**	**4.80 J**	**3.1**	**2.0**	**0.87**	**0.9**	**2.0**	**1.30**	0.9 U
Selenium	2.94 U	3.11 U	1.60 U	1.09 U	0.98 U	1.11 U	1.16 U	0.95 U	1.03 U
Silver	1.96 U	2.07 U	1.07 U	0.73 U	0.65 U	0.74 U	0.77 U	0.63 U	0.68 U
Thallium	4.40 U	4.66 U	2.41 UJ	1.63 U	1.47 U	1.66 U	1.74 U	1.42 UJ	1.54 U
Vanadium	**7.10**	**9.00**	**12.5**	**5.0 J**	**4.0 J**	**3.4 J**	**21.2 J**	**5.0**	**4.1 J**
Zinc	**26.7**	**63.7**	**50.2 J**	**8.6**	**5.0**	**14.5**	**18.4**	**4.4 J**	**4.2**
Tin	**68.0 J**	**93.00 J**	**4.3**	2.2 U	1.6 U	1.9 U	2.1 U	2.5	2.0 U
Titanium	2.00 U	**2.20**	**123**	**91.0 J**	**57.0 J**	**64.0 J**	**111 J**	**92.0**	**85.0 J**

*SED-10 is a field duplicate of SED-5

Table 5-F: Sulfides

Sample Number	SED-1	SED-2
Units	mg/Kg	mg/Kg
Analyte	Result Q	Result Q
Sulfide, Total	48.90 U	51.80 U

TABLE 6
ANALYTICAL RESULTS FOR GROUND WATER SAMPLES

Table 6-A: VOCs

Sample Number	GW-1	GW-2	W-6	W-7	W-17
Units	ug/L	ug/L	ug/L	ug/L	ug/L
Analyte	Result Q	Result Q	Result Q	Result Q	Result Q
1,1,1,2-Tetrachloroethane	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
1,1,1-Trichloroethane	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
1,1,2,2-Tetrachloroethane	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
1,1,2-Trichloroethane	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
1,1-Dichlorethane	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
1,1-Dichloroethene	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
1,1-Dichloropropene	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
1,2,3-Trichlorobenzene	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
1,2,3-Trichlorpropane	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
1,2,4-Trichlorobenzene	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
1,2,4-Trimethylbenzene	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
1,2-Dibromo-3-Chloropropane	25.0 U	25.0 U	25.0 U	25.0 U	25.0 U
1,2-Dibromoethane	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
1,2-Dichlorobenzene	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
1,2-Dichloroethane	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
1,2-Dichloropropane	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
1,3,5-Trimethylbenzene	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
1,3-Dichlorobenzene	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
1,3-Dichloropropane	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
1,4-Dichlorobenzene	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
2,2-Dichloropropane	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
2-Butanone	100 U	100 U	100 U	100 U	100 U
2-Chlorotoluene	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
2-Chloroethylvinyether	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
2-Hexanone	50.0 U	50.0 U	50.0 U	50.0 U	50.0 U
4-Chlorotoluene	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
4-Methyl-2-pentanone	100 U	100 U	100 U	100 U	100 U
Acetone	20.0 U	20.0 U	20.0 U	20.0 U	20.0 U
Acrylonitrile	5.00 R	5.00 R	5.00 R	5.00 R	5.00 R
Benzene	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
Bromobenzene	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
Bromochloromethane	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
Bromodichloromethane	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
Bromoform	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
Bromomethane	5.00 UJ	5.00 UJ	5.00 UJ	5.00 UJ	5.00 UJ
Carbon disulfide	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
Carbon tetrachloride	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
Chlorobenzene	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
Chloroethane	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
Chloroform	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
Chloromethane	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
Dibromochloromethane	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
Dibromomethane	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
Ethylbenzene	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
I[illegible]methane	5.00 UJ	5.00 UJ	5.00 UJ	5.00 UJ	5.00 UJ
Methylene Chloride	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U

Table 6-A: VOCs

Sample Number	GW-1		GW-2		W-6		W-7		W-17	
s	ug/L		ug/L		ug/L		ug/L		ug/L	
Analyte	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Styrene	5.00	U	5.00	U	5.00	U	5.00	U	5.00	U
Tetrachloroethene	5.00	U	5.00	U	5.00	U	5.00	U	5.00	U
Toluene	5.00	U	5.00	U	5.00	U	5.00	U	5.00	U
Trichloroethene	5.00	U	5.00	U	5.00	U	5.00	U	5.00	U
Trichlorofluoromethane	5.00	U	5.00	U	5.00	U	5.00	U	5.00	U
Vinyl acetate	50.0	U	50.0	U	50.0	U	50.0	U	50.0	U
Vinyl Chloride	2.00	U	2.00	U	2.00	U	2.00	U	2.00	U
cis-1,2-Dichloroethene	5.00	U	5.00	U	5.00	U	5.00	U	5.00	U
cis-1,3-Dichloropropene	5.00	U	5.00	U	5.00	U	5.00	U	5.00	U
m+p-Xylene	5.00	U	5.00	U	5.00	U	5.00	U	5.00	U
o-Xylene	5.00	U	5.00	U	5.00	U	5.00	U	5.00	U
trans-1,2-Dichloroethene	5.00	U	5.00	U	5.00	U	5.00	U	5.00	U
trans-1,3-Dichloropropene	5.00	U	5.00	U	5.00	UJ	5.00	UJ	5.00	UJ
trans-1,4-Dichloro-2-butene	100	UJ	100	UJ	100	U	100	U	100	U

*W-17 is a field duplicate of W-7

TABLE 6
ANALYTICAL RESULTS FOR GROUND WATER SAMPLES

Table 6-B: SVOCs

Sample Number	W-7		W-17*		EB-2**	
Units	ug/L		ug/L		ug/L	
Analyte	Result	Qual	Result	Qual	Result	Qual
1,2-Dichlorobenzene	10.0	U	10.0	U	10.0	U
1,3-Dichlorobenzene	10.0	U	10.0	U	10.0	U
1,4-Dichlorobenzene	10.0	U	10.0	U	10.0	U
1,2,4-Trichlorobenzene	10.0	U	10.0	U	10.0	U
2,4,5-Trichlorophenol	10.0	U	10.0	U	10.0	U
2,4,6-Trichlorophenol	10.0	U	10.0	U	10.0	U
2,4-Dichlorophenol	10.0	U	10.0	U	10.0	U
2,4-Dimethylphenol	10.0	U	10.0	U	10.0	U
2,4-Dinitrophenol	50.0	U	50.0	U	50.0	U
2,4-Dinitrotoluene	10.0	U	10.0	U	10.0	U
2,6-Dinitrotolune	10.0	U	10.0	U	10.0	U
2-Chloronaphthalene	10.0	U	10.0	U	10.0	U
2-Chlorophenol	10.0	U	10.0	U	10.0	U
2-Methylnaphthalene	10.0	U	10.0	U	10.0	U
2-Methylphenol	10.0	U	10.0	U	10.0	U
2-Nitroanaline	50.0	U	50.0	U	50.0	U
2-Nitrophenol	10.0	U	10.0	U	10.0	U
3,3'-Dichlorobenzidine	20.0	U	20.0	U	20.0	U
3-Nitroanaline	50.0	U	50.0	U	50.0	U
4,6-Ditnitro-2-methylphenol	50.0	U	50.0	U	50.0	U
4-Bromophenyl Phenyl Ether	10.0	U	10.0	U	10.0	U
4-Chloro-3-methylphenol	20.0	U	20.0	U	20.0	U
4-Chloroanaline	20.0	U	20.0	U	20.0	U
4-Chlorophenyl Phenyl Ether	10.0	U	10.0	U	10.0	U
4-Methylphenol	10.0	U	10.0	U	10.0	U
4-Nitroanaline	50.0	UJ	50.0	UJ	50.0	U
4-Nitrophenol	50.0	U	50.0	U	50.0	U
Acenaphthene	10.0	U	10.0	U	10.0	U
Acenaphthylene	10.0	U	10.0	U	10.0	U
Anthracene	10.0	U	10.0	U	10.0	U
Benzo(a)Anthracene	10.0	U	10.0	U	10.0	U
Benzo(a)Pyrene	10.0	U	10.0	UJ	10.0	U
Benzo(b)Fluoranthene	10.0	U	10.0	UJ	10.0	U
Benzo(g,h,i)Perylene	10.0	U	10.0	UJ	10.0	U
Benzo(k)Fluoranthene	10.0	U	10.0	UJ	10.0	U
Benzoic acid	50.0	U	50.0	U	50.0	U
Benzyl Alcohol	20.0	U	20.0	U	20.0	U
Bis(2-Chloroethyl)ether	10.0	UJ	10.0	UJ	10.0	U
Bis(2-Chloroisopropyl)ether	10.0	U	10.0	U	10.0	U
Bis(2-chloroethoxy)methane	10.0	U	10.0	U	10.0	U
Bis(2-ethylhexyl)phthalate	10.0	UJ	10.0	UJ	10.0	U
Butyl Benzyl Phthalate	10.0	UJ	10.0	UJ	10.0	U
Carbazole	10.0	U	10.0	U	10.0	U
Chrysene	10.0	U	10.0	U	10.0	U
Di-n-Butyl Phthalate	10.0	U	10.0	U	10.0	U
Di-n-octylphthalate	10.0	U	10.0	UJ	10.0	U
Dibenzo(a,h)Anthracene	10.0	U	10.0	UJ	10.0	U
Dibenzofuran	10.0	U	10.0	U	10.0	U
Diethyl Phthalate	10.0	U	10.0	U	10.0	U
Dimethyl Phthalate	10.0	U	10.0	U	10.0	U
Fluoranthene	10.0	U	10.0	U	10.0	U
Fluorene	10.0	U	10.0	U	10.0	U

Table 6-B: SVOCs

Sample Number	W-7		W-17*		EB-2**	
Units	ug/L		ug/L		ug/L	
Analyte	Result	Qual	Result	Qual	Result	Qual
1,2-Dichlorobenzene	10.0	U	10.0	U	10.0	U
Hexachlorobenzene	10.0	U	10.0	U	10.0	U
Hexachlorobutadiene	10.0	U	10.0	U	10.0	U
Hexachlorocyclopentadiene	10.0	U	10.0	U	10.0	U
Hexachloroethane	10.0	U	10.0	U	10.0	U
Indeno(1,2,3-CD)Pyrene	10.0	U	10.0	UJ	10.0	U
Isophorone	10.0	U	10.0	U	10.0	U
N-Nitroso-di-n-propylamine	10.0	U	10.0	U	10.0	U
N-Nitrosodiphenylamine	10.0	U	10.0	U	10.0	U
Naphthalene	10.0	U	10.0	U	10.0	U
Nitrobenzene	10.0	U	10.0	U	10.0	U
Pentachlorophenol	50.0	U	50.0	U	50.0	U
Phenanthrene	10.0	U	10.0	U	10.0	U
Phenol	10.0	U	10.0	U	10.0	U
Pyrene	10.0	U	10.0	U	10.0	U

*W-17 is a field duplicate of W-7

**EB-2 is an equipment blank for equipment used to collect ground water samples

TABLE 6
ANALYTICAL RESULTS FOR GROUND WATER SAMPLES

Table 6-C: PCBs

Sample Number	GW-1		GW-2		W-7		W-17*		EB-2**	
Units	ug/L		ug/L		ug/L		ug/L		ug/L	
Analyte	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Aroclor 1016	0.650	U	0.650	U	0.650	U	0.650	U	0.650	U
Aroclor 1221	0.650	U	0.650	U	0.650	U	0.650	U	0.650	U
Aroclor 1232	0.650	U	0.650	U	0.650	U	0.650	U	0.650	U
Aroclor 1242	0.650	U	0.650	U	0.650	U	0.650	U	0.650	U
Aroclor 1248	0.650	U	0.650	U	0.650	U	0.650	U	0.650	U
Aroclor 1254	0.650	U	0.650	U	0.650	U	0.650	U	0.650	U
Aroclor 1260	0.650	U	0.650	U	0.650	U	0.650	U	0.686	N

*W-17 is a field duplicate of W-7

**EB-2 is an equipment blank for equipment used to collect ground water samples

TABLE 6
ANALYTICAL RESULTS FOR GROUND WATER SAMPLES

Table 6-D: Appendix IX Metals and Titanium

Sample Number	GW-1	GW-2	W-6	W-7	W-17	EB-2**	EB-3***
Units	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Analyte	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q
Antimony	30.0 U	30.0 U	30.0 U	30.0 U	30.0 U	30.0 U	30.0 U
Barium	131	570	65.6	76.3	75.7	3.0 U	3.0 U
Beryllium	1.0 U	2.2	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Cadmium	2.0 U	2.0	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Chromium	45.4	69.7	3.6	3.0	2.6	2.0 U	2.0 U
Cobalt	2.0 U	14.2	2.2	3.3	4.3	2.0 U	2.0 U
Copper	18.1	21.9	4.6	4.1	4.1	4.0 U	4.0
Lead	5.0 U	50.5	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Mercury	0.2	0.4	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Nickel	7.7	27.8	7.0	11.5	12.3	4.0 U	4.0 U
Selenium	6.0 U	6.0 U	6.0 U	6.0 U	6.0 U	6.0 U	6.0 U
Silver	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Thallium	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U
Vanadium	44.7	216	4.6	3.5	3.9	3.0 U	3.0 UJ
Zinc	19.0 U	95.7	19.0 U	19.0 U	19.0 U	19.0 U	19.0 U
Titanium	963 J	1140 J	61.8 J	57.8 J	38.3 J	2.0 UJ	2.0 U
Tin	4.0 U	5.9	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U

**EB-2 is an equipment blank for equipment used to collect ground water samples
***EB-3 is an equipment blank for equipment used to collect surface water samples

Table 6-E: Sulfides, Nitrates, Nitrites

Sample Number	GW-1	GW-2	W-7	W-17	EB-3**	EB-2***
Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Analyte	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q
Nitrite-Nitrogen	0.010 U	0.010 U	0.010 U	0.010 U	NA	NA
Nitrate-Nitrogen	**0.480** J	**0.496** J	**581** J	**0.141** J	NA	NA
Sulfide, Total	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U

**EB-2 is an equipment blank for equipment used to collect ground water samples
***EB-3 is an equipment blank for equipment used to collect surface water samples

TABLE 7
QC SAMPLE VOC RESULTS

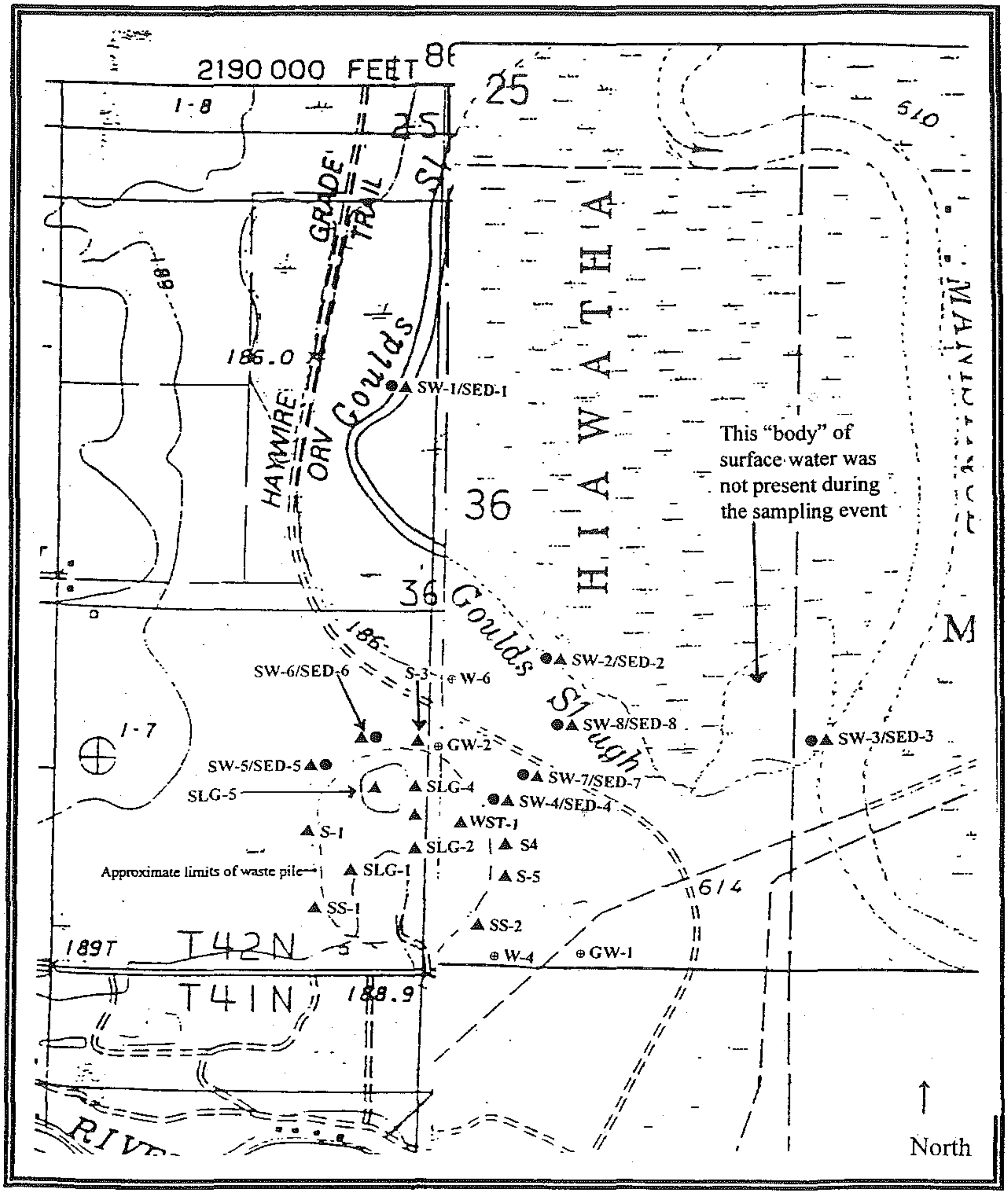
Sample Number	TB-1	TB-2 (Trip Blank)	EB-2*	EB-3**
Units	ug/L	ug/L	ug/L	ug/L
Analyte	Result Q	Result Q	Result Q	Result Q
1,1,1,2-Tetrachloroethane	5.00 U	5.00 UJ	5.00 U	5.00 U
1,1,1-Trichloroethane	5.00 U	5.00 UJ	5.00 U	5.00 U
1,1,2,2-Tetrachloroethane	5.00 UJ	5.00 UJ	5.00 U	5.00 U
1,1,2-Trichloroethane	5.00 U	5.00 UJ	5.00 U	5.00 U
1,1-Dichlorethane	5.00 U	5.00 UJ	5.00 U	5.00 U
1,1-Dichloroethene	5.00 U	5.00 UJ	5.00 U	5.00 U
1,1-Dichloropropene	5.00 U	5.00 UJ	5.00 U	5.00 U
1,2,3-Trichlorobenzene	5.00 UJ	5.00 UJ	5.00 U	5.00 U
1,2,3-Trichloropropane	5.00 U	5.00 UJ	5.00 U	5.00 U
1,2,4-Trichlorobenzene	5.00 U	5.00 UJ	5.00 U	5.00 U
1,2,4-Trimethylbenzene	5.00 U	5.00 UJ	5.00 U	5.00 U
1,2-Dibromo-3-Chloropropane	25.0 UJ	25.0 UJ	25.0 U	25.0 U
1,2-Dibromoethane	5.00 U	5.00 UJ	5.00 U	5.00 U
1,2-Dichlorobenzene	5.00 U	5.00 UJ	5.00 U	5.00 U
1,2-Dichloroethane	5.00 U	5.00 UJ	5.00 U	5.00 U
1,2-Dichloropropane	5.00 U	5.00 UJ	5.00 U	5.00 U
1,3,5-Trimethylbenzene	5.00 U	5.00 UJ	5.00 U	5.00 U
1,3-Dichlorobenzene	5.00 U	5.00 UJ	5.00 U	5.00 U
1,3-Dichloropropane	5.00 U	5.00 UJ	5.00 U	5.00 U
1,4-Dichlorobenzene	5.00 U	5.00 UJ	5.00 U	5.00 U
2,2-Dichloropropane	5.00 U	5.00 UJ	5.00 U	5.00 U
2-Butanone	100 UJ	100 UJ	100 U	100 U
2-Chlorotoluene	5.00 U	5.00 UJ	5.00 U	5.00 U
2-Chloroethylvinyether	10.0 U	10.0 UJ	10.0 U	10.0 U
2-Hexanone	50.0 UJ	50.0 UJ	50.0 U	50.0 U
4-Chlorotoluene	5.00 U	5.00 UJ	5.00 U	5.00 U
4-Methyl-2-pentanone	100 U	100 UJ	100 U	100 U
Acetone	20.0 R	20.0 R	20.0 U	20.0 U
Acrylonitrile	5.00 R	5.00 R	5.00 R	5.00 R
Benzene	5.00 U	5.00 UJ	5.00 U	5.00 U
Bromobenzene	5.00 U	5.00 UJ	5.00 U	5.00 U
Bromochloromethane	5.00 U	5.00 UJ	5.00 U	5.00 U
Bromodichloromethane	5.00 U	5.00 UJ	5.00 U	5.00 U
Bromoform	5.00 U	5.00 UJ	5.00 U	5.00 U
Bromomethane	5.00 U	5.00 UJ	5.00 UJ	5.00 UJ
Carbon disulfide	5.00 U	5.00 UJ	5.00 U	5.00 U
Carbon tetrachloride	5.00 U	5.00 UJ	5.00 U	5.00 U
Chlorobenzene	5.00 U	5.00 UJ	5.00 U	5.00 U
Chloroethane	5.00 U	5.00 UJ	5.00 U	5.00 U
Chloroform	5.00 U	5.00 UJ	5.00 U	5.00 U
hloromethane	5.00 U	5.00 UJ	5.00 U	5.00 U

Sample Number	TB-1	TB-2 (Trip Blank)	EB-2*	EB-3**
Units	ug/L	ug/L	ug/L	ug/L
Analyte	Result Q	Result Q	Result Q	Result Q
Dibromochloromethane	5.00 U	5.00 UJ	5.00 U	5.00 U
Dibromomethane	5.00 U	5.00 UJ	5.00 U	5.00 U
Ethylbenzene	5.00 U	5.00 UJ	5.00 U	5.00 U
Iodomethane	5.00 UJ	5.00 UJ	5.00 UJ	5.00 UJ
Methylene Chloride	5.00 U	5.00 UJ	20.6	18.7
Styrene	5.00 U	5.00 UJ	5.00 U	5.00 U
Tetrachloroethene	5.00 U	5.00 UJ	5.00 U	5.00 U
Toluene	5.00 U	5.00 UJ	5.00 U	5.00 U
Trichloroethene	5.00 U	5.00 UJ	5.00 U	5.00 U
Trichlorofluoromethane	5.00 U	5.00 UJ	5.00 U	5.00 U
Vinyl acetate	50.0 U	50.0 UJ	50.0 U	50.0 U
Vinyl Chloride	2.00 U	2.00 UJ	2.00 U	2.00 U
cis-1,2-Dichloroethene	5.00 U	5.00 UJ	5.00 U	5.00 U
cis-1,3-Dichloropropene	5.00 U	5.00 UJ	5.00 U	5.00 U
m+p-Xylene	5.00 U	5.00 UJ	5.00 U	5.00 U
o-Xylene	5.00 U	5.00 UJ	5.00 U	5.00 U
trans-1,2-Dichloroethene	5.00 U	5.00 UJ	5.00 U	5.00 U
trans-1,3-Dichloropropene	5.00 U	5.00 UJ	5.00 UJ	5.00 UJ
trans-1,4-Dichloro-2-butene	100 U	100 UJ	100 U	100 U

*EB-2 is an equipment blank for ground water samples

**EB-3 is an equipment blank for surface water samples

FIGURE 1: FIELD SKETCH OF SAMPLE LOCATIONS



Note: Sample locations not to scale

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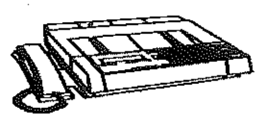

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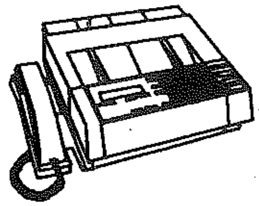

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D. Sharrow

TECHLAW INC.

20 NORTH WACKER DRIVE, SUITE 1260, CHICAGO, IL 60606
PHONE: (312) 578-8900
FAX: (312) 578-8904

RZ2.R05020.01.ID.193

March 5, 1998

Mr. Brian Freeman
U.S. Environmental Protection Agency
Region 5 DRE-9J
77 West Jackson Boulevard
Chicago, IL 60604

Reference: EPA Contract No. 68-W9-0006; EPA Work Assignment No. R05020; Manistique Papers, Inc; EPA ID No. MID981192628; Field Sampling and Analysis Report Residuals Management Area; Tasks 06 and 08 Deliverable

Dear Mr. Freeman:

Please find enclosed TechLaw's Field Sampling and Analysis Report for the Residuals Management Area (RMA) at the Manistique Papers, Inc., facility in Hiawatha, Michigan. Also enclosed is an electronic version formatted in Word Perfect 6.1 for Windows on a 3.5 inch diskette.

As you know, the TechLaw Team subcontractor laboratory used for this assignment, Intertek Testing Services (ITS), recently alerted TechLaw and U.S. EPA of irregularities in their reporting of volatile organic compound (VOC) results during a time period which included the analysis of samples obtained during this field event. In addition, due to a laboratory error, the semivolatile organic compound (SVOC) aliquiots for two groundwater samples were not analyzed. Based on the potential end use of the data and ITS's acknowledged responsibility for these problems, ITS has agreed to cover all costs associated with the necessary resampling and analysis. Therefore, upon direction from either you or Ms. Diane Sharrow, the U.S. EPA Region 5 Technical Lead, we will initiate preparation for the resampling event.

Based on the depth to bedrock and the presence of wetland-type areas to the north and northeast of the RMA waste pile, it is recommended that U.S. EPA consider collecting groundwater samples from wells installed into the bedrock downgradient of the waste pile, if further sampling is conducted. During the sampling event, TechLaw encountered what appeared to be bedrock at very shallow depths in the area to the north of the RMA waste pile, with rock encountered between 0.5 and three feet below the surface at locations Sed-6 and GW-2, respectively. Also, depth-to-groundwater measurements collected by TechLaw indicated that shallow groundwater exists in unconsolidated materials very near the surface to the north and northeast of the waste pile, which is the reported direction of groundwater flow. Since the waste pile is situated within areas where the groundwater table is nearly at the surface and bedrock may be present very near the base of the waste pile, it is likely that contaminants leaching out of the waste pile sludge might be detected to the underlying bedrock aquifer rather than the adjacent unconsolidated materials.

During the sampling event, Manistique's consultant indicated that deep monitoring wells were recently installed in the vicinity of the RMA. These wells were not sampled by TechLaw since they had reportedly not been developed at the time of TechLaw's site-investigation. If U.S. EPA is to conduct follow-up groundwater sampling, it is recommended that samples be collected from the wells installed into the bedrock. These wells should provide a better indication of whether releases to groundwater are occurring.

If you have any questions, please contact me or Mr. Rob Young at (312)345-8966.

Sincerely,

Patricia BrownDerocher

Patricia Brown-Derocher
Regional Manager

cc: F. Norling, EPA Region 5, w/out attachments
D. Sharrow, EPA Region 5
W. Jordan, Central Files
R. Young
Chicago Central Files

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FIELD SAMPLING AND ANALYSIS REPORT
RESIDUALS MANAGEMENT AREA

MANISTIQUE PAPERS, INC.
EPA ID No. MID981192628

Submitted to:

Mr. Brian Freeman
U.S. Environmental Protection Agency
Region 5 DRE-9J
77 West Jackson Boulevard
Chicago, Illinois 60604

Submitted by:

TechLaw, Inc.
20 North Wacker Drive - Suite 1260
Chicago, Illinois 60606

EPA Work Assignment No.	**R05020**
Contract No.	**68-W4-0006**
TechLaw WAM	**Patricia Brown-Derocher**
Telephone No.	**312/345-8963**
EPA WAM	**Brian Freeman**
Telephone No.	**312/353-2720**

March, 5 1998

FIELD SAMPLING AND ANALYSIS REPORT
RESIDUALS MANAGEMENT AREA

MANISTIQUE PAPERS, INC.
EPA ID No. MID981192628

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FIELD SAMPLING AND ANALYSIS REPORT
RESIDUALS MANAGEMENT AREA

MANISTIQUE PAPERS, INC.
EPA ID No. MID981192628

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FIELD SAMPLING AND ANALYSIS REPORT
RESIDUALS MANAGEMENT AREA

MANISTIQUE PAPERS, INC.
EPA ID No. MID981192628

1.0 INTRODUCTION

Manistique

The United States Environmental Protection Agency (U.S. EPA) requested that TechLaw, Inc. (TechLaw) support the Agency in conducting sample collection activities and subsequent sample analysis at the Residuals Management Area (RMA) operated by Manistique Papers, Inc., (Manistique Papers) in Hiawatha, Michigan. Sampling activities involved the collection of waste pile residual material (sludge), soil, surface water, sediment, and groundwater samples which were analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), sulfide, nitrate/nitrite, total Appendix IX metals, and titanium.

The aforementioned sampling event took place from November 17 through November 20, 1997. TechLaw was represented by a Field Team consisting of Messrs. Rob Young, Todd Quillen, Kevin Higgins, and Anthony Mubiru. Also present during these activities were:

Ms. Diane Sharrow (U.S EPA)
Mr. Mark Attanasoff (Metcalf & Eddy, Inc.)
Mr. Jim Cook (Manistique Papers, Inc.)
Mr. Clayton Ebsch (Bittner Engineering, Inc.)
Mr. Frank Chenier (Bittner Engineering, Inc.)
Mr. Terry Myer (Matrix Technologies)
Mr. Eric Anders (Matrix Technologies)
Mr. Robert Schmeling [Michigan Department of Environmental Quality - (Michigan DEQ)]
Mr. Hank Switzer (Michigan DEQ)

Metcalf & Eddy, Inc., was onsite as TechLaw's subcontractor. Bittner Engineering, Inc., provides environmental consultation services to Manistique Papers, Inc. Matrix Technologies was contracted by TechLaw to perform direct push sampling.

The Field Team began by touring the site in order to determine the most appropriate sampling locations, then proceeded to collect samples of waste pile sludge, soil, surface water, sediment, and groundwater. Sampling procedures were conducted in accordance with those presented in the November 12, 1997 Manistique Papers RMA, Site Specific Sampling and Analysis Plan (SAP), with exceptions noted in Section 3.0 below. Tables 3 through 6 present the analytical results received from the laboratory for the samples collected. Figure 1 shows all the sampling locations. Appendix A of this Report contains the Photographic Log documenting field observations and Appendix B includes copies of the Field Notes taken by the Field Team.

2.0 FACILITY PROCESSES/WASTE MANAGEMENT

The information presented in this section is a summary of several documents in file materials supplied by U.S. EPA Region 5.

Manistique Papers is a manufacturer of various paper products. The company has disposed of paper mill process wastes at the RMA since 1973. The wastes are transported by truck from the company's manufacturing facility and disposed of in a large waste pile at the RMA.

The RMA is a 230-acre site located within a 480-acre property owned by Manistique Papers. Approximately 45 of the 230-acres are considered to be under active use, (i.e., used for managing residuals from the paper plant). The RMA is located approximately 1.5 miles north of the city of Manistique and is surrounded by heavily wooded land that is owned by Manistique Papers. The waste pile is an unlined, non-engineered above-ground waste management unit estimated to have a thickness ranging from 20-feet in the south to 50-feet in the north.

File materials indicate that most of the waste materials disposed of at the RMA consist of dewatered wastewater treatment sludges, as well as fly ash and bottom ash generated from the boilers at the paper mill facility. In addition, the RMA reportedly contains miscellaneous wood and paper wastes.

The Field Team collected subsurface samples of the waste pile material from five different locations during the sampling event. Visual observations appeared to confirm the presence of wastewater treatment sludges and fly/bottom ash within the waste pile. Representatives of Manistique Papers were actively disposing of dewatered wastewater treatment sludges in the eastern portion of the waste pile at the same time the sampling event was performed.

The land surface around the waste pile is generally flat and there are stationary water bodies and marshy areas surrounding most of the waste pile. The RMA is situated in a low-lying, marshy area between Indian River to the west and Manistique River to the East and Northeast. These marshy areas surrounding the waste pile appear to be wetlands, although identification of these areas as jurisdictional wetlands was not part of the work assignment activities. There is an extensive marshy area called Gould's Slough located approximately 900 feet northeast of the RMA site. Pooled water areas were observed in areas to the north, east and west of the RMA. Surface drainage across the site is believed to flow from north and then east towards Gould's Slough Creek, a tributary of the Manistique River. However, channelized surface water flows (i.e., in the form of a ditch or creek) from the waste pile to Gould's Slough Creek was not observed during the sampling event.

There are eight groundwater monitoring wells located at the RMA site. Historical file materials indicate that the groundwater level is approximately 12 feet below ground surface. As discussed in the next paragraph, the groundwater level measurements collected by the Field Team at the time of the sampling event showed much shallower depths to groundwater.

As part of the investigation, the Field Team collected water level measurements from five wells using a water level sounding instrument. The following measurements were recorded.

TABLE 1 - WATER LEVEL MEASUREMENTS

Well Number	Depth to Groundwater from Top of Inner Casing (feet)	Approximate Depth Below Ground Surface (feet)
W-2	2.11	0.1
W-4 (not sampled)	4.37	0.9
W-6	5.0	2.5
W-7	2.6	At ground surface~0.1
W-8	3.61	0.6

The water level measurements show that the groundwater in the areas surrounding the RMA is very shallow, with depths ranging from 0.1 to 2.5 feet below the ground surface. This is consistent with the marshy conditions surrounding the RMA.

Historical file materials indicate that groundwater is estimated to flow in the northeasterly direction at a rate of 55 feet per year. The area's subsurface geology is characterized as sand overlying fractured, crystalline limestone beds. Historical files indicate that the limestone occurs at depths of five to 20 feet below ground surface. Observations during the sampling event confirmed a very shallow depth to bedrock in the northern portion of the RMA. At surface water/sediment sampling location SW-6 /Sed-6 , a very hard layer was encountered approximately four inches (0.33 feet) below ground surface. A hard layer was also encountered at several locations near GW-2, at depths of about two to four feet below ground surface. In both cases, it appeared that bedrock was encountered, although actual samples of the bedrock material could not be collected.

3.0 SAMPLING PROCEDURES

The Field Team began the sampling visit by touring the site in order to determine the most appropriate sampling locations. The Field Team then proceeded to collect samples of waste pile sludge, soil, surface water, sediment, and groundwater for various parameters according to the following procedures described below.

A. Waste Pile/Sludge Sampling

Matrix Technologies was contracted by TechLaw to assist with the collection of sludge samples from the waste pile. Sludge samples were collected by means of a geoprobe. The samples were collected from five different sampling locations within the waste pile as shown in Figure 1. Samples were collected at various depth intervals from each boring location. Split samples were collected from all sampling locations by Manistique Papers' associated consultants, Bittner Engineering, Inc.

The rationale for boring location selection was to place three of the borings (SLG-1 through SLG-3) in the southern half of the waste pile, since it was thought to be the most likely area to have received PCB-laden sludges in the 1970s. The geoprobe boring at location SLG-4 was installed in the center of the northern portion of the waste pile to characterize waste dumped in that area. The last geoprobe boring, SLG-5, was located northeast of the boring at SLG-4. SLG-5 was selected because some potential "river gravel" had been identified at SLG-4. The "river gravel" was thought to represent settling pond and de-inking lagoon sludges that had previously been dumped into the RMA. Therefore, if the "river gravel" was detected as far north as at location SLG-4, then it appeared likely that it would be detected at SLG-5. In addition, one sample of freshly dumped papermill sludge (WST-1) was collected and sent to the laboratory for analysis.

Each of the geoprobe borings was continuously sampled using a split spoon. As proposed in the SAP, two screening methods were used to establish sampling depths and parameters for subsequent laboratory analysis. The methods included an immunoassay screening method for PCBs and the screening of split spoon cuttings using a photoionization detector (PID). Visual observations of physical characteristics such as color, grain size, moisture content, and odor were also used in selecting sampling depths and parameters. These observations are documented in Table 2 below.

After being screened for PCBs using an immunoassay methodology as described in Section 3.0 E of this Report, a total of 20 waste pile/sludge samples were sent to the laboratory for analysis. These samples were analyzed for the presence of TCLP metals, VOCs, SVOCs, Appendix IX Metals, titanium, sulfide, and PCBs as shown in Table 2. The waste pile boring locations are shown in Figure 1.

TABLE 2 - WASTE PILE SAMPLING SUMMARY

Boring Number/ Boring Depth	Parameters Analyzed	Remarks
SLG-1 (2 - 4)	TCLP metals	Highly organic, 1.6 - 2.2 ppm on PID
SLG-1 (10 - 12)	VOC, SVOC, Appendix IX metals & titanium, sulfide	Odor, high organic matter content, 2.2 - 3.3 ppm on PID

Boring Number/ Boring Depth	Parameters Analyzed	Remarks
SLG-1 (24 - 26)	PCB, Appendix IX metals & titanium, sulfide	"Papery" sludge stuck in lumps, no PID
SLG-2 (0 - 2)	TCLP metals	Topsoil/fly ash, high organic matter content
SLG-2 (16 - 18)	PCB, Appendix IX metals & titanium, sulfide	"Papery" sludge, grey, approximate PCB concentration determined using immunoassay method was 4 ppm (See Section 3.0 E)
SLG-32 (16 - 18)	Appendix IX metals & titanium, sulfide	Duplicate for SLG-2 (16 - 18) (Partial analytical parameters list due to limited sample volume.)
SLG-2 (22 - 24)	VOC, SVOC, Appendix IX metals & titanium, sulfide	"Papery" sludge, grey
SLG-3 (12 - 14)	VOC, SVOC, Appendix IX metals & titanium, sulfide	"Papery" sludge, grey
SLG-3 (18 - 20)	PCB, Appendix IX metals & titanium, sulfide	Wet brown sand and sludge, approximate PCB concentration determined using immunoassay method was 4 ppm (See Section 3.0 E)
SLG-3 (24 - 26)	TCLP metals	Brown sand with medium to coarse texture and some sludge in isolated clumps
SLG-33 (24 - 26)	TCLP metals	Duplicate for SLG-3 (24 - 26)
SLG-4 (4 - 6)	VOC, SVOC, Appendix IX metals & titanium, sulfide	Fly ash and sludge, 20.5 ppm on PID
SLG-4 (12 - 14)	TCLP metals	Fly ash and sludge, 0 - 3.5 ppm on PID
SLG-4 (16 - 18)	PCB, Appendix IX metals & titanium, sulfide	Wet sludge with native material, 0 - 4 ppm on PID
SLG-5 (8 - 10)	VOC, SVOC, Appendix IX metals & titanium, sulfide	Sludge with fly ash on top, 30 ppm on PID
SLG-35 (8 - 10)	VOC, SVOC	Duplicate for SLG-5 (8 - 10) (Partial analytical parameters list due to limited sample volume.)
SLG-5 (14 - 16)	TCLP metals	Sludge, 25 ppm on PID
SLG-5 (16 - 18)	PCB, Appendix IX metals & titanium, sulfide	Sludge and wet fly ash, 2 - 12 ppm on PID
SLG-35 (16 - 18)	PCB, Appendix IX metals	Duplicate for SLG-5 (16 - 18)
WST-1	SVOC, PCB, Appendix IX metals & titanium, sulfide	Representative sample of residuals dumped during sampling event.

B. Soil Sampling

The SAP had called for the collection of four soil samples from different locations adjacent to the waste pile where impacts due to surface water runoff may have occurred. These samples were then to be analyzed using the immunoassay screening method to identify relative levels of PCB concentrations. The two sample locations showing the highest concentrations of PCBs would consequently be resampled and sent to the laboratory to be analyzed for the presence of PCBs, SVOCs, and Appendix IX Metals (plus titanium). The SAP also called for the collection of a maximum of two soil samples from the southern portion of the waste pile in case the geoprobe drill reached the soil beneath the waste pile during the collection of waste pile samples. No soil samples were collected from locations directly underneath the southern portions of the waste pile since soils were not encountered.

With regard to proposed soil sample collection adjacent to the waste pile, as discussed previously, the areas surrounding the waste pile are very marshy (appear to be wetlands) and there is very little "soil" material near the surface. The earthen materials surrounding the waste pile consist of either decomposed organic material or a mixture of decomposed organic material and sediment that has run off the waste pile. In most areas, this "soil" material surrounding the waste pile extended to depths of at least six inches below ground surface and was generally covered by water. Therefore, the "soils" collected during the field sampling event were potentially analogous to the "sediments" collected from around the waste pile, as discussed in Section 3.0C below.

During the sampling event five soil samples (S-1 through S-5) were collected from different locations adjacent to the waste pile where impacts due to surface runoff may have occurred. Split samples were collected from all sampling locations by Manistique Papers' associated consultants, Bittner Engineering, Inc. Based on observations of surface water flow off the waste pile, the five samples were concentrated on the northern section of the waste pile (see Figure 1). The soil samples were collected after clearing away plant debris and/or waste pile residuals from the ground surface. The samples were analyzed using the immunoassay screening method described in Section 3.0E below to identify relative levels of PCBs. None of the samples showed PCB concentrations significantly above the background/control sample. Therefore, two additional samples (SS-1 and SS-2) were collected from areas adjacent to the southeast and southwest portions of the waste pile for laboratory analysis. SS-1 and SS-2 were collected from these locations since the areas southeast and southwest of the waste pile were not covered by the previous soil sample screening (S1 - S5) and sediment sampling (Sed-4, Sed-5 and Sed-6) adjacent to the waste pile.

SS-1 was collected at a location southwest of the waste pile, approximately 1,000-feet south of soil sample location S-1. The soil material collected from sampling location SS-1 consisted of a silty to sandy, dark brown organic material. The sample collected at location SS-2 consisted of a silty-sandy matrix with high organic matter content. The entire area around the southeast corner of the RMA near location SS-2 is low-lying and had pooled/standing water in several places, and the sampling location was covered with about two inches of water.

Neither duplicates nor matrix spike/matrix spike duplicates were collected at SS-1 or SS-2 since the soil material was basically the same as the sediment sample material collected from locations Sed-1 through Sed-8. Samples SS-1 and SS-2 were collected using a hand auger in the same manner as most of the sediment samples (See Section 3.0C below), and analyzed for SVOCs, PCBs, Appendix IX metals and titanium.

C. Surface Water and Sediment Sampling

Surface water and co-located sediment samples were collected from eight sampling locations around the RMA and in Gould's Slough as shown in Figure 1. The samples from Gould's Slough were collected starting at the downstream location, working upstream to avoid potential disturbance between samples. Split samples were collected from all sampling locations by Manistique Papers' associated consultants, Bittner Engineering, Inc. Surface water samples were analyzed for VOCs, Appendix IX metals and titanium, and sulfide. Sediment samples were analyzed for SVOCs, PCBs, Appendix IX metals and titanium, and sulfide.

Locations adjacent to the waste pile

Sampling stations SW-5 and Sed-5 were collected from areas of pooled surface water to the northern portion of the waste pile. Manistique Papers representatives indicated that the pooled areas at sampling stations SW-5/Sed-5 and SW-6/Sed-6 are hydraulically connected by an 18 inch PVC pipe. The pipe was reported to run under the toe of the northwestern portion of the RMA. Sample SW-5/Sed-5 was collected first, from a location adjacent to the northwestern corner of the waste pile. Sample SW-10/Sed-10 (field duplicate of SW-5/Sed-5) was collected coincidentally from the same location. Sample SW-6/Sed-6 (including the matrix spike/matrix spike duplicate) was collected at the northern toe of the waste pile. The equipment blank (EB-1) was collected immediately after completion of sampling activities at location SW-6/Sed-6. Sample SW-4/Sed-4 was collected from a location at the northeastern toe of the waste pile. The sample location at SW-4/Sed-4 was also an area of pooled surface water at the time of the sampling event.

Locations between Gould's Slough and the RMA

The objective of surface water/sediment sample collection in areas in the north/northeastern portion of the RMA was to characterize surface water features that may act as channels between the waste pile and Gould's Slough. However, based on a careful reconnaissance of the area most of the water between the RMA and Gould's Slough appeared to be "stagnant" (i.e., it was not flowing), and no channelized flow was observed. Therefore, as described below, the proposed surface water/sediment sample locations were revised in the area between the RMA and Gould's Slough (locations SW-7/Sed-7 and SW-8/Sed-8). SW-7/Sed-7 was collected from a low-lying marshy area adjacent to the abandoned railroad grade/access road that runs to the northeast of the RMA. The location of SW-7/Sed-7 appeared to be at a lower elevation than surrounding areas. It appeared that sediments may accumulate in the lower topography at the SW-7/Sed-7 location. SW-8/Sed-8 was collected across the access road from SW-7/Sed-7. The wetland area around SW-8/Sed-8 appeared to be continuous between the above-mentioned access road and Gould's Slough.

Locations within Gould's Slough

The surface water/sediment samples SW-1/Sed-1 through SW-3/Sed-3 were collected from Gould's Slough. Surface water/sediment sample collection in the Gould's Slough area was from the most downstream (SW-3/Sed-3) to the most upstream (SW-1/Sed-1) locations.

At the time of the sampling event, the surface water flow patterns on the east side of Gould's Slough (near the Manistique River and sampling location SW-3/Sed-3) were different from what is shown in the U.S. EPA file materials and the USGS topographic map. The large surface water body at the eastern end of Gould's Slough, near the river, was not present during the sampling event. SW-3/Sed-3 were collected from the location shown in Figure 1 from a running stream that leads into Manistique River. The surface water at this location was clear and did not appear to have as high an organic matter content as at other locations. The water at this location was channelized and flowing. Sed-3 was collected from the surface of a depositional area (0-2") at the edge of the creek channel. The stream from which SW-3/Sed-3 were collected appeared to receive waterflow from a wooded area up gradient and east of the RMA, in addition to receiving channelized flow from Gould's Slough.

The samples SW-2/Sed-2 were collected from the southwestern edge of Gould's Slough (see Figure 1). The sample was collected from a marshy area with about one foot of ice-covered water.

SW-1/Sed-1 were collected from a location upstream of Gould's Slough, where the channel was about 40 to 50 feet wide and over four feet deep. The stream was iced over and it did not appear that there was significant flow. SW-1/Sed-1 were the final surface water/sediment samples collected during the sampling event.

All the surface water samples (SW-1 through SW-8, with the exception of SW-3) were collected by breaking through an ice layer that had formed over the pool of water which was sampled. Care was taken not to disturb the water body beneath the ice covering. The surface water samples were collected either by gently submerging the sample containers into the surface water or by dipping a pre-cleaned plastic beaker into the water and then filling the containers. Surface water samples were collected prior to sediment samples so as to minimize disturbance of the water.

Each of the sediment samples (Sed-1 through Sed-8, with the exception of Sed-3) was collected by means of a hand auger. The sediment material collected in the hand auger was placed into a stainless steel bowl and homogenized before placement into sample containers. Sediment sample Sed-3 was collected by transferring the sediment directly into the sample containers using a pre-cleaned stainless steel spoon, since the sediments at this location were easily accessible and not covered by more than six inches of surface water.

Equipment blank EB-3 was collected from a precleaned beaker used to collect a surface water sample.

D. Groundwater Sampling

Split samples were collected from all sampling locations by Manistique Papers' associated consultants, Bittner Engineering, Inc.

Groundwater samples were collected from two existing monitoring wells (W-6 and W-7) in the vicinity of the RMA and from two temporary wells (GW-1 and GW-2) installed during the sampling event using a geoprobe. The depths and water levels of the existing groundwater monitoring wells were determined using water sounding equipment. All the wells were purged and sampled using a pre-cleaned disposable bailer. In addition, indicator parameters (pH, specific conductivity and temperature) were measured before purging and also after each well volume was extracted. All the wells from which samples were collected were purged of at least three well volumes before samples were collected. The groundwater samples were sent to the laboratory to be analyzed for VOCs, SVOCs, PCBs, Appendix IX metals, titanium, sulfide, and nitrate/nitrite.

The SAP called for the collection of groundwater samples from wells at locations W-4, W-5, W-6, and W-8. Once in the field, however, modifications to this plan were made as discussed below.

Approximately one week before this sampling event, Bittner Engineering had installed new wells adjacent to the wells at locations W-4 and W-8. The Field Team decided against collecting samples from the old (pre-existing) wells since the samples would not have been representative of site groundwater conditions due to the drilling and well construction activities that had been conducted the previous week. The new wells installed by Bittner Engineering were not sampled since the wells had reportedly not yet been developed.

Bittner Engineering personnel indicated that W-5 no longer exists and the Field Team could not locate the well. Bittner Engineering personnel also indicated that recovery from well W-6 had historically been very poor, which was confirmed by Field Team personnel during the sampling event. The recovery rate from well W-6 was so low that only enough sample volume was collected for VOC and metals (Appendix IX and titanium) analysis.

Monitoring well GW-1 was a temporary well installed using a geoprobe by TechLaw's subcontractor, Matrix Technologies. The well was placed upgradient of the RMA (based on available hydrogeologic information) and was sampled first. It was installed with a one inch, slotted, PVC screen between five feet to ten feet below ground surface. This screen depth was selected based on the measured depth to water at well W-4, which was located approximately 150 feet west of GW-1. The depth to water at W-4 was measured at approximately 0.9 feet bgs and the ground elevation at GW-1 was approximately three to four feet higher than at W-4. Thus, the five to ten feet bgs interval was selected. The Field Team collected samples from the newly installed temporary well GW-1 instead of a newly installed nearby well (W-4) because the sampling team was concerned that the water quality (i.e., sample representativeness) at W-4 may have been affected as a result of W-4's recent installation, and the fact the well had not been developed.

Well GW-2, located just northeast of the waste pile, was installed using a one inch PVC well point and slam-bar. The slam-bar was used because the geoprobe could not access the chosen location for GW-2. The well was screened from zero to five feet bgs, since groundwater was encountered at approximately 0.5 feet bgs. Well GW-2 was sampled using a one inch disposable bailer.

The Field Team also collected samples from existing groundwater monitoring well W-7 located northeast of the RMA (See Figure 1). A field duplicate sample (designated as W-17)was also collected from this well.

An equipment blank sample was not collected during groundwater sample collection activities, since the bailers were pre-cleaned and disposed of after sampling at dedicated wells.

E. Immunoassay Screening Procedure

An enzyme immunoassay was used to perform a semi-quantitative test of waste pile (SLG-2 and SLG-3) and soil (S-1 through S-5) samples for PCBs. The PCB immunoassay technique involved mixing soil and sludge samples per manufacturer's specifications with various liquids and comparing the resultant color changes to those of reference solutions. The Field Team used kits supplied by Strategic Diagnostics, Inc., which are reported to have the capability to detect Aroclors 1016, 1242, 1248, 1254, and 1260. The immunoassay results indicated that the PCB concentration in all the soil samples (S-1 to S-5) was in the 1 to 4 ppm range.

Similarly, the PCB concentrations in the screened waste pile samples SLG-2(16 - 18), SLG-3(8 - 10), and SLG-3(18 - 20) were in the 1 to 4 ppm range. The waste pile sample collected from boring SLG-2(20 - 22) showed a PCB concentration range of 4 to 15 ppm. The control sample for this analysis was collected from soil near a hotel that is located approximately 1.5 miles south of the RMA. It showed a PCB concentration of 1 ppm.

As is apparent from comparison of the field and laboratory PCB results, it appears that the PCB imunoassy technicque did not provide reliable results. One of the reagents in the PCB test kit crystalized, apparently due to the cold temperatures during the sampling event. In addition, no significant quality issues were identified during validation of the laboratory PCB data, further supporting the finding that the field PCB results should be considered unreliable.

F. Quality Control Samples

The quality control samples collected during this sampling event consisted of field duplicates, matrix spike/matrix spike duplicates (MS/MSDs), equipment blanks, and trip blanks.

Four field duplicate samples were obtained during the waste pile/sludge sampling event, using the above-described protocol for other waste pile/sludge samples. Sample SLG-32 (16-18) was collected as a duplicate for sample SLG-2 (16-18). It was analyzed for Appendix IX metals, titanium and sulfides. Sample SLG-33 (24-26) was collected as a duplicate for sample SLG-3(24-26), and it was analyzed for TCLP metals. Sample SLG-35(8-10) was obtained as a duplicate for sample SLG-5 (8-10) and it was analyzed for VOCs, and SVOCs. Sample SLG-35 (16-18) was obtained as a duplicate for sample SLG-5 (16-18) and it was analyzed for the presence of PCBs and Appendix IX metals. The analytical parameter lists for each field duplicate was shorter than the corresponding field sample due to sample volume constraints.

No field duplicates were obtained for the two soil samples, SS-1 and SS-2, sent for laboratory analysis because the soil was considered to be of the same matrix as the sediment samples (Sed-1 through Sed-8). The entire area around the RMA consists of a wetland-type soil and the soil samples were collected in the same manner as the sediment samples.

Sample SW-10/Sed-10 was obtained as a surface water/sediment duplicate of sample SW-5/Sed-5. The field duplicate samples were analyzed for the same parameters as the original field samples.

Equipment blanks were collected in conjunction with sludge, sediment and surface water samples. The equipment blank sample in conjunction with the sediment samples, EB-1, was collected by rinsing the auger, spoon and bowl used to collect and homogenize the samples with deionized water. EB-1 samples were analyzed for SVOCs, PCBs, Appendix IX metals, and titanium. Another equipment blank sample, EB-2, was obtained during waste pile sludge sample collection activities, rinsing the geoprobe macrocore with deionized water. EB-2 samples were analyzed for VOCs, SVOCs, PCBs, Appendix IX metals, titanium, and nitrates/nitrites. Similarly, a surface water equipment blank sample (EB-3) was obtained by collecting the deionized water reinstate from the sample beaker. These samples were analyzed for the presence of VOCs, Appendix IX metals, titanium, and sulfides.

Two sets of trip blanks, TB-1 and TB-2, were placed into sample coolers with the aqueous VOC samples shipped to the laboratory. Each set consisted of two containers of deionized water with hydrochloric acid preservative. The trip blanks were analyzed for VOCs.

G. Sample Packaging and Shipment

The samples collected during the above-described sampling events were sent to the laboratory in multiple shipments. The sample containers were labeled, tagged, placed into plastic bags and then into bubble wrap before being placed into iced coolers. The ice in the coolers was double wrapped in ziplock bags. Chain of custody forms were completed and signed, and the sample coolers were then sealed. Custody seals were placed on the coolers before they were shipped to the laboratory with Federal Express as the courier.

4.0 ANALYTICAL RESULTS

Validated laboratory analytical results for each parameter are presented in Tables 3 through 7. The analytical results for the samples collected from the waste pile are presented in Tables 3-A through 3-F. The analytical results for the soil samples are presented in Tables 4-A through 4-C. Analytical results for the surface water and sediment samples are presented in Tables 5-A through 5-G. The analytical results for groundwater samples are presented in Tables 6-A through 6-E. Table 7 presents the VOC results for the quality control samples.

Waste Pile Samples: Tables 3-A through 3-F

As shown in Table 3-A, several substituted benzene compounds were detected in borings SLG-4 (4' - 6') and SLG-5 (8' - 10'). For example, a relatively high concentration (48,000 ug/kg) of 1,2,4-trimethylbenzene was detected in boring SLG-5 (8' - 10'). Other isomers of substituted benzene compounds that were detected in boring SLG-5 (8' - 10') include 1,3,5-trimethylbenzene (16,600 ug/Kg), meta-and para-isomers of xylene (11,600 ug/Kg), ortho-xylene (5,190 ug/Kg), ethylybenzene (3,260 ug/Kg), and toluene (3,050 ug/Kg). Substituted benzene compounds detected in boring SLG-4 (4-6) include 1,2,4-trimethylbenzene (2,510 ug/Kg), 1,3,5-trimethylbenzene (2,320 ug/Kg), and toluene (1,180 ug/Kg). Acetone was also detected in the samples collected from borings SLG-4 (4' - 6') and SLG-5 (8' - 10') at concentrations of 6,900 ug/Kg and 6,410 ug/Kg respectively. There were no VOCs detected in the samples collected from borings SLG-1 (10' - 12'), and Acetone, 2-butarone and toluene were detected at estimated concentrations (276 ug/Kg, 83 ug/Kg and 211 ug/Kg, respectively) in sample SLG-3 (12' - 14').

The VOC results were compared to the Generic Soil Screening Levels ("Generic SSLs") found in Appendix A of the *Soil Screening Guidance: Technical Background Document* (EPA/540/R-95/128; May, 1996). SSL values for the soil to groundwater migration pathway were used to screen the VOC concentrations detected in the sludge samples. This pathway was evaluated since the sludge is present at depth within an non-engineered waste pile, and constituents in material within the pile could leach to groundwater via precipitation infiltration. It should be noted, however, that the sludge material is fine-grained and contained paper fibers which, based on visual observations, do not appear to be very permeable.

The concentration of 1,2,4-trimethylbenzene at SLG-5 (8' - 10') exceeded the Generic SSL with a dilution attenuation factor (DAF) of 20 (Generic SSLs are listed with DAFs of 20 and one. The concentrations of acetone, etlylbenzene, toluene and the various xylene isomers detected in SLG-5 (8' - 10') did not exceed the Generic SSLs for these compounds at a DAF of 20. However, the concentrations of these compounds did exceed the Generic SSLs at a DAF of 1. In addition, the concentrations of acetone and toluene in SLG-4 (4' - 6') did not exceed Generic SSLs at DAF of 20, but did exceed the Generic SSLs for these compounds at a DAF of 1. SSLs do not exist for 1,2,3,-trichlorobenzene 1,3,5-trichlorobenzene.

The SVOCs detected in the sludge material (See Table 3-B) included 2-methylnaphthalene, 2-methylphenol, 4-methylphenol, bis(2-ethylhexyl)phthalate, di-n-Butyl Phthalate, and naphthalene.

2-Methylnaphthalene was detected in borings SLG-2(22' - 24'), SLG-5(8' - 10') and SLG-35(8' - 10') at concentrations of 4.77mg/Kg, 40.80 mg/Kg and 8.35 mg/Kg respectively. 2-Methylphenol was detected in boring SLG-1(10' - 12') at a concentration of 8.06 mg/Kg while 4-methylphenol was detected in the same boring at a concentration of 6.99 mg/Kg. bis(2-Ethylhexyl) phthalate was detected in boring SLG-5(8' - 10') at a concentration of 8.00 mg/Kg. Di-n-Butyl Phthalate was detected in boring SLG-2(22' - 24') at a concentration of 5.14 mg/Kg and naphthalene was detected in boring SLG-5(8' - 10) at a concentration of 10.80 mg/Kg.

The SVOC results were compared to the Generic SSLs for the soil to groundwater pathway for the same reasons discussed above for the VOC results. The concentrations of 2-methylphenol in SLG-1 (10' - 12') and naphthalene in SLG-5 (8' - 10') did not exceed the Generic SSLs at a DAF of 20, but did exceed the Generic SSLs for these compounds at a DAF of 1. Concentrations of bis (2-ethylhexyl) phthalate and di-n-butyl-phthalate did not exceed the Generic SSLs for these compounds at a DAF of 1. Generic SSLs are not listed for 2-methylnaphthalene or 4-methylphenol.

As shown in Table 3-C, there were no PCBs detected in the waste pile samples that were collected and analyzed by the laboratory.

The Appendix IX metals and titanium results for the sludge samples are presented in Table 3-D. Various metals were detected in each of the waste pile sludge samples. Antimony, cadmium, silver and thallium were not detected in any of the samples. The highest concentrations of metals were generally detected in samples SLG-4 (4' - 6'), SLG-4 (16' - 18'), SLG-5 (8' - 10') and SLG-5 (16' - 18'). The concentrations of arsenic, barium, chromium, nickel and selenium did not exceed the Generic SSLs at a DAF of 20. However, the concentrations of these metals did exceed the

Generic SSLs at a DAF of 1 in a selected number of samples. Concentrations of beryllium, mercury, vanadium and zinc did not exceed the Generic SSLs at a DAF of 1. Generic SSLs are not listed for cobalt, copper, titanium or tin.

As shown in Table 3-E, there were no detections of sulfides in any of the waste pile samples.

Table 3-F presents the results of TCLP Metals analyses conducted on various waste pile samples. Barium, chromium and lead were detected in several samples, but at concentrations below the regulatory limits listed in 40 CFR 261.24 Table 1.

Soil Samples: Tables 4-A through 4-C

Tables 4-A and 4-B show the SVOC analytical results for soil samples SS-1 and SS-2. There were no SVOCs or PCBs detected in either of the soil samples. It should be noted that the reporting limits for the SVOCs analysis were elevated due to significant matrix interference. It appears likely that this matrix interference was due to the high organic matter content of the samples.

Table 4-C shows the analytical results of Appendix IX metals analysis for the soil samples SS-1 and SS-2. Various metals were detected in each of the soil samples. Antimony, selenium, silver and thallium were not detected in either of the samples. The soil sample detects were compared to the sediment values presented in Appendix A of U.S. EPA's Region 5-specific Ecological Date Quality Levels (EDQLs) Final Report (August, 1996). Appendix A lists the most conservative EDQLS (chronic criteria) for sediments. Based on the U.S. EPA Region 5 guidance document, the EDQLs can be used as a screening tool to determine whether there may be a potential threat to the environment. Sediment EDQLs were used since the soil samples were collected from wetland-type areas where sedimentation has likely occurred and ecological species would be the most likely receptors of concern.

The soil sample result or non-detect reporting limits which exceeded the corresponding Appendix A EDQL are summarized below.

Metal	Sample	Reported Concentration (mg/Kg)	EDQL (mg/Kg)	
Arsenic	SS-2	9.6	5.9	5 mg/L
Cadmium	SS-1	0.92	0.596	1
Cadmium	SS-2	0.62	0.596	1
Chromium	SS-1	32.7	26	5
Copper	SS-1	20.6	16	—

Metal	Sample	Reported Concentration (mg/Kg)	EDQL (mg/Kg)	
Mercury	SS-2	0.187	0.174	.2 mg/L
Silver	SS-1	1.70 U	0.50	5 mg/L
Silver	SS-1	1.23 U	0.50	
Zinc	SS-1	179	120	

There are no sediment EDQLs provided in Appendix A for barium, beryllium, selenium, tin, titanium, thallium or zinc.

Surface Water and Sediment Samples: Tables 5-A through 5-H

Surface Water

Table 5-A presents the results of VOC analysis for surface water samples, showing that toluene was the only compound detected. The reported concentration of 15.40 ug/L was found to be less than the EDQL value for toluene of 5,000 ug/L, which is the "federal" Value listed in Appendix B of the U.S. EPA EDQL document.

Several metals were detected in the eight surface water samples collected. The samples were not filtered, therefore the concentrations reported in Table 5-B represent total concentrations of metals in the surface water. Antimony, beryllium, cadmium, chromium, mercury, selenium, silver, thallium and tin were not detected in the surface water samples. The reported concentrations presented in Table 5-B were compared to the "federal" EDQLs listed in Appendix B of the U.S. EPA Region 5 EDQL document unless a value for the State of Michigan was listed, in which case the more conservative value was used for screening purposes. Concentrations of copper in surface water samples SW-4, SW-6 and SW-7 exceeded the federal EDQL of 6.5 ug/L. Concentrations of nickel and zinc were lower than the associated federal EDQLs for these metals (i.e., nickel 87.7 ug/L, zinc 110 ug/L). EDQLs based on federal and Michigan standards are not listed for barium, cobalt, titanium or vanadium.

As shown in Table 5-C, no sulfides were detected above the reporting limit of 1.00 ug/L.

Sediments

Tables 5-D, 5-E and 5-G present the results of SVOC, PCB and wet chemistry (sulfides, nitrates, nitrites) respectively for the sediment samples. As indicated in the tables, no SVOCs, PCBs, sulfides, nitrates or nitrites were detected.

Table 5-F presents the results of Appendix IX metals and titanium analyses on the sediment samples. Antimony, cadmium, selenium, silver and thallium were not detected in any of the sediment samples. The sediment metal detects were compared to the sediment values presented in Appendix A of U.S. EPA's Region 5-specific EDQL Final Report for screening purposes. The only sediment result which exceeded the EDQL was mercury in sample SED-4 in which the detected concentration (0.174 mg/Kg) equaled the EDQL. There are no sediment EDQLs provided in Appendix A for barium, beryllium, selenium, tin, titanium, thallium or zinc.

Groundwater Samples: Tables D-1 through D-5

The subcontractor laboratory did not provide SVOC analytical results for the samples collected from the temporary groundwater sampling wells GW-1 and GW-2 due to laboratory error.

As shown in the Tables 6-A, 6-B and 6-C, there were no VOCs, SVOCs or PCBs target compounds detected in the groundwater samples analyzed for these parameters.

Table 6-D presents the analytical results for Appendix IX metals and titanium. Various metals were detected in each of the groundwater samples. In general, concentrations of metals in groundwater sample GW-2 were higher than in the other samples. Antimony, beryllium, cadmium, selenium, silver and thallium were not detected in any of the samples.

Concentrations of metals detected in the groundwater samples were compared to federal Maximum Contaminant Levels (MCLs) established under the Safe Drinking Water Act (SWDA). If MCLs were not published, the detected concentrations were compared to U.S. EPA Region 5 RCRA Data Quality Levels (December, 1995) (RCRA DQLs) for a screening point of comparison. Barium, chromium, mercury and nickel concentrations detected in the groundwater were all below published MCLs. The lead concentration in GW-2 (50.5 ug/L) exceeded the "action level" that is listed under the SWDA (15 ug/L), as well as the RCRA DQL for lead (4 ug/L). Lead was not detected in any of the other samples. Copper, tin and vanadium concentrations were all below the listed RCRA DQLs, although the concentration of vanadium in GW-2 (216 ug/L) was close to the RCRA DQL for that metal (260 ug/L). Cobalt and titanium do not have a published MCL or a listed RCRA DQL, although titanium was detected at relatively higher concentrations in GW-1 and GW2.

Table 6-E presents the wet chemistry results (sulfides, nitrates, nitrites). No sulfide was detected above the reporting limit of 1.00 mg/L. Nitrate-nitrogen was found in the GW-1, GW-2, W-7, and W-17 samples at estimated concentrations of 0.480 mg/L, 0.496 mg/L, 581 mg/L, and 0.141 mg/L respectively. However, there are no listed Maximum Contamination Level (MCL) values with which to compare the nitrate concentrations.

Equipment and Trip Blank Samples

The only VOC detected in the quality control samples was methylene chloride, which was detected in Equipment Blank-2 (EB-2) and Equipment Blank-3 (EB-3) at concentrations of 20.6 ug/L and 18.7 ug/L respectively. However, since methylene chloride is a common laboratory artifact, it is likely that the detection of this compound is attributable to laboratory rather than field contamination.

TABLE 3
ANALYTICAL RESULTS FOR WASTE PILE SAMPLES

Table 3-A: VOCs

Sample Number	SLG-1 (10-12)	SLG-2 (22-24)	SLG-3 (12-14)	SLG-4 (4-6)	SLG-5 (8-10)	SLG-35 (8-10)*
Units	mg/Kg	mg/Kg	mg/Kg	ug/Kg	ug/Kg	ug/Kg
Analyte	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q
1,1,1,2-Tetrachloroethane	12.8 U	12.4 U	9.07 U	1160 UD	1070 UD	1100 UD
1,1,1-Trichloroethane	12.8 U	12.4 U	9.07 U	1160 UD	1070 UD	1100 UD
1,1,2,2-Tetrachloroethane	12.8 UJ	12.4 U	9.07 R	1160 UD	1070 UD	1100 UD
1,1,2-Trichloroethane	12.8 U	12.4 U	9.07 U	1160 UD	1070 UD	1100 UD
1,1-Dichlorethane	12.8 U	12.4 U	9.07 U	1160 UD	1070 UD	1100 UD
1,1-Dichloroethene	12.8 U	12.4 U	9.07 U	1160 UD	1070 UD	1100 UD
1,1-Dichloropropene	12.8 U	12.4 U	9.07 U	1160 UD	1070 UD	1100 UD
1,2,3-Trichlorobenzene	12.8 UJ	12.4 U	9.07 R	1160 UD	1070 UD	**1830** D
1,2,3-Trichlorpropane	12.8 UJ	12.4 U	9.07 R	1160 UD	1070 UD	1100 UD
1,2,4-Trichlorobenzene	12.8 UJ	12.4 U	9.07 R	1160 UD	1070 UD	1100 UD
1,2,4-Trimethylbenzene	12.8 UJ	12.4 U	9.07 R	**2510** D	**48000** D	**2300** D
1,2-Dibromo-3-Chloropropane	64.2 UJ	62.1 U	45.4 R	5810 UD	5360 UD	5520 UD
1,2-Dibromoethane	12.8 U	12.4 U	9.07 U	1160 UD	1070 UD	1100 UD
1,2-Dichlorobenzene	12.8 UJ	12.4 U	9.07 R	1160 UD	1070 UD	1100 UD
1,2-Dichloroethane	12.8 U	12.4 U	9.07 U	1160 UD	1070 UD	1100 UD
1,2-Dichloropropane	12.8 U	12.4 U	9.07 U	1160 UD	1070 UD	1100 UD
1,3,5-Trimethylbenzene	12.8 UJ	12.4 U	9.07 R	**2320** D	**16600** D	**2450** D
1,3-Dichlorobenzene	12.8 U	12.4 U	9.07 U	1160 UD	1070 UD	1100 UD
1,3-Dichloropropane	12.8 U	12.4 U	9.07 U			
1,4-Dichlorobenzene	12.8 UJ	12.4 U	9.07 R	1160 UD	1070 UD	1100 UD
2,2-Dichloropropane	12.8 U	12.4 U	9.07 U	1160 UD	1070 UD	1100 UD
2-Butanone	257 UJ	248 UJ	**83 J**	23200 UD	21500 UD	22100 UD
2-Chlorotoluene	12.8 UJ	12.4 U	9.07 R	2320 UDJ	2150 UDJ	2210 UDJ
2-Chloroethylvinyether	25.7 UJ	24.8 UJ	18.1 UJ	1160 UD	1070 UD	1100 UD
2-Hexanone	128 U	124.0 U	90.7 U	11600 UD	10700 UD	11000 UD
4-Chlorotoluene	13 UJ	12.4 U	9.07 R	1160 UD	1070 UD	1100 UD
4-Methyl-2-pentanone	257 U	248.0 U	181 U	23200 UD	21500 UD	22100 UD
Acetone	90 UJ	49.3 UJ	**276 J**	**6900** DJ	**6410** DJ	**5870** DJ
Acrylonitrile	13 UJ	12.4 UR	9.07 R	1160 R	1070 R	1100 R
Benzene	13 U	12.4 U	9.07 U	1160 UD	1070 UD	1100 UD
Bromobenzene	13 UJ	12.4 U	9.07 R	1160 UD	1070 UD	1100 UD
Bromochloromethane	13 U	12.4 U	9.07 U	1160 UD	1070 UD	1100 UD
Bromodichloromethane	13 U	12.4 U	9.07 U	1160 UD	1070 UD	1100 UD
Bromoform	13 U	12.4 U	9.07 U	1160 UD	1070 UD	1100 UD
Bromomethane	13 U	12.4 U	9.07 U	1160 UD	1070 UD	1100 UD
Carbon disulfide	13 U	12.4 U	9.07 U	1160 UD	1070 UD	1100 UD
Carbon tetrachloride	13 U	12.4 U	9.07 U	1160 UD	1070 UD	1100 UD
Chlorobenzene	13 U	12.4 U	9.07 U	1160 UD	1070 UD	1100 UD
Chloroethane	13 U	12.4 U	9.07 U	1160 UD	1070 UD	1100 UD
Chloroform	13 U	12.4 U	9.07 U	1160 UD	1070 UD	1100 UD
Chloromethane	13 U	12.4 U	9.07 U	1160 UD	1070 UD	1100 UD
Dibromochloromethane	13 U	12.4 U	9.07 U	1160 UD	1070 UD	1100 UD
Dibromomethane	13 U	12.4 U	9.07 U	1160 UD	1070 UD	1100 UD
Ethylbenzene	13 U	12.4 U	9.07 U	1160 UD	**3260** D	1100 UD
Iodomethane	13 U	12.4 U	9.07 U	1160 UD	1070 UD	1100 UD
Methylene Chloride	13 U	20.6 U	9.07 U	1160 UD	1070 UD	1100 UD
Styrene	13 U	12.4 U	9.07 U	1160 UD	1070 UD	1100 UD
Tetrachloroethene	13 U	12.4 U	9.07 U	1160 UD	1070 UD	1100 UD
Toluene	13 U	12.4 U	**211** J	**1180** D	**3050** D	**1250** D
Tri[illegible]oethene	13 U	12.4 U	9.07 U	1160 UD	1070 UD	1100 UD

Table 3-A: VOCs

Sample Number	SLG-1 (10-12)		SLG-2 (22-24)		SLG-3 (12-14)		SLG-4 (4-6)		SLG-5 (8-10)		SLG-35 ([illegible])*	
Units	mg/Kg		mg/Kg		mg/Kg		ug/Kg		ug/Kg		ug/Kg	
Analyte	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Trichlorofluoromethane	13	U	12.4	U	9.07	U	1160	UD	1070	UD	1100	UD
Vinyl acetate	128	U	124	U	90.7	U	1160	UDJ	1070	UDJ	1100	UDJ
Vinyl Chloride	13	U	12.4	U	9.07	U	465	UD	429	UD	442	UD
cis-1,2-Dichloroethene	13	U	12.4	U	9.07	U	1160	UD	1070	UD	1100	UD
cis-1,3-Dichloropropene	13	U	12.4	U	9.07	U	1160	UD	1070	UD	1100	UD
m+p-Xylene	13	U	12.4	U	9.07	U	1160	UD	**11600**	D	1100	UD
o-Xylene	13	U	12.4	U	9.07	U	1160	UD	**5190**	D	1100	UD
trans-1,2-Dichloroethene	13	U	12.4	U	9.07	U	1160	UD	1070	UD	1100	UD
trans-1,3-Dichloropropene	13	U	12.4	U	9.07	U	1160	UD	1070	UD	1100	UD
trans-1,4-Dichloro-2-butene	257	R	248	R	181	R	23200	R	21500	R	22100	R

*SLG-35 8-10 is a field duplicate of SLG-5 8-10

TABLE 3
ANALYTICAL RESULTS FOR WASTE PILE SAMPLES

Table 3-B: SVOCs

Sample Number	SLG-1 (10-12)		SLG-2 (22-24)		SLG-3 (12-14)		SLG-4 (4-6)		SLG-5 (8-10)		SLG-35 8-10*		WST-1	
Units	ug/Kg		ug/Kg		ug/Kg		ug/Kg		ug/Kg		ug/Kg		ug/Kg	
Analyte	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
1,2-Dichlorobenzene	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
1,3-Dichlorobenzene	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
1,4-Dichlorobenzene	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
1,2,4-Trichlorobenzene	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
2,4,5-Trichlorophenol	41.30	UD	41,000	UD	29,500	UD	76,700	UD	14,200	UD	71,400	UD	33,000	UDJ
2,4,6-Trichlorophenol	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
2,4-Dichlorophenol	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
2,4-Dimethylphenol	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
2,4-Dinitrophenol	41,300	UD	41,000	UD	29,500	UD	76,700	UD	14,200	UD	71,400	UD	33,000	UDJ
2,4-Dinitrotoluene	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
2,6-Dinitrotolune	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
2-Chloronaphthalene	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
2-Chlorophenol	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
2-Methylnaphthalene	8,250	UD	**4,770**	**JD**	5,900	UD	15,300	UD	**40,800**	D	8,350	JD	6,600	UDJ
2-Methylphenol	**8,060**	**JD**	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
2-Nitroanaline	41,300	UD	41,000	UD	29,500	UD	76,700	UD	70,800	UD	71,400	UD	33,000	UDJ
2-Nitrophenol	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
3,3'-Dichlorobenzidine	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	13,000	UDJ
3-Nitroanaline	41,300	UD	41,000	UD	29,500	UD	76,700	UD	70,800	UD	71,400	UD	33,000	UDJ
4,6-Ditnitro-2-methylphenol	41,300	UD	41,000	UD	29,500	UD	76,700	UD	70,800	UD	71,400	UD	33,000	UDJ
4-Bromophenyl Phenyl Ether	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
4-Chloro-3-methylphenol	8,250	UD	8,190	UD	5,900	UD	30,200	UD	27,900	UD	28,100	UD	13,000	UDJ
4-Chloroanaline	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	13,000	UDJ
4-Chlorophenyl Phenyl Ether	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
4-Methylphenol	**6,990**	**JD**	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
4-Nitroanaline	41,300	UD	41,000	UD	29,500	UD	76,700	UD	70,800	UD	71,400	UD	33,000	UDJ
4-Nitrophenol	41,300	UD	41,000	UD	14,300	UD	37,200	UD	34,300	UD	34,700	UD	16,000	UDJ
Acenaphthene	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
Acenaphthylene	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
Anthracene	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
Benzo(a)Anthracene	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
Benzo(a)Pyrene	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
Benzo(b)Fluoranthene	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
Benzo(g,h,i)Perylene	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
Benzo(k)Fluoranthene	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ

Table 3-B: SVOCs

Sample Number	SLG-1 (10-12)		SLG-2 (22-24)		SLG-3 (12-14)		SLG-4 (4-6)		SLG-5 (8-10)		SLG-35 8-10*		WST-1	
Units	ug/Kg		ug/Kg		ug/Kg		ug/Kg		ug/Kg		ug/Kg		ug/Kg	
Analyte	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Benzoic acid	41,300	UD	41,000	UD	29,500	UD	37,200	UD	34,300	UD	34,700	UD	16,000	UDJ
Benzyl Alcohol	16,300	UD	16,100	UD	11,600	UD	30,200	UD	27,900	UD	28,100	UD	13,000	UDJ
Bis(2-Chloroethyl)ether	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
Bis(2-Chloroisopropyl)ether	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
Bis(2-chloroethoxy)methane	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
Bis(2-ethylhexyl)phthalate	8,250	UD	8,190	UD	5,900	UD	15,300	UD	8,000	JD	14,300	UD	6,600	UDJ
Butyl Benzyl Phthalate	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
Carbazole	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
Chrysene	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
Di-n-Butyl Phthalate	8,250	UD	8,190	JD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
Di-n-octylphthalate	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
Dibenzo(a,h)Anthracene	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
Dibenzofuran	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
Diethyl Phthalate	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
Dimethyl Phthalate	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
Fluoranthene	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
Fluorene	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
Hexachlorobenzene	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
Hexachlorobutadiene	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
Hexachlorocyclopentadiene	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
Hexachloroethane	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
Indeno(1,2,3-CD)Pyrene	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
Isophorone	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
N-Nitroso-di-n-propylamine	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
N-Nitrosodiphenylamine	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
Naphthalene	8,250	UD	8,190	UD	5,900	UD	15,300	UD	10,800	JD	14,300	UD	6,600	UDJ
Nitrobenzene	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
Pentachlorophenol	41,300	UD	41,000	UD	29,500	UD	76,700	UD	70,800	UD	71,400	UD	33,000	UDJ
Phenanthrene	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
Phenol	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ
Pyrene	8,250	UD	8,190	UD	5,900	UD	15,300	UD	14,200	UD	14,300	UD	6,600	UDJ

*SLG-35 8-10 is a field duplicate of SLG-5 8-10

TABLE 3
ANALYTICAL RESULTS FOR WASTE PILE SAMPLES

Table 3-C: PCBs

Sample Number	SLG-1 (24-26)	SLG-2 (16-18)	SLG-3 (18-20)	SLG-4 (16-18)	SLG-5 (16-18)	WST-1	SLG-35 16-18*
Units	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg
Analyte	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q
Aroclor 1016	282 U	295 U	195 U	164 U	98.7 U	121 U	107 U
Aroclor 1221	282 U	295 U	195 U	164 U	98.7 U	121 U	107 U
Aroclor 1232	282 U	295 U	195 U	164 U	98.7 U	121 U	107 U
Aroclor 1242	282 U	295 U	195 U	164 U	98.7 U	121 U	107 U
Aroclor 1248	282 U	295 U	195 U	164 U	98.7 U	121 U	107 U
Aroclor 1254	282 U	295 U	195 U	164 U	98.7 U	121 U	107 U
Aroclor 1260	282 U	295 U	195 U	164 U	98.7 U	121 U	107 U

*SLG-35 16-18 is a field duplicate of SLG-5 16-18

TABLE 3
ANALYTICAL RESULTS FOR WASTE PILE SAMPLES

Table 3-D: Appendix IX Metals

Sample Number	SLG-1 (10-12)	SLG-1 (24-26)	SLG-2 (16-18)	SLG-32 (16-18)*	SLG-2 (22-24)	SLG-3 (12-14)	SLG-3 (18-20)	SLG-4 (4-6)	SLG-4 (16-18)	SLG-5 (8-10)	SLG-5 (16-18)	WST-1
Units	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
Analyte	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q
Antimony	2.60 UJ	2.80 UJ	2.90 UJ	3.10 UJ	2.50 UJ	1.80 UJ	2.00 UJ	2.30 UJ	3.30 UJ	2.10 UJ	2.00 UJ	2.40 UJ
Arsenic	2.50	3.60	0.51	1.50 U	0.97	1.60	1.4	**21.7**	1.60 U	1.40	**4.40**	1.20 U
Barium	107	248	65.3	63.6	96.30	57.60	46.1	**214**	**111**	**36.7**	**70**	**31.90**
Beryllium	0.29	0.54	0.29 U	0.31 U	0.24 U	0.17	0.19 U	**2.3**	0.44 U	0.38	**0.82**	0.25
Cadmium	0.51 U	0.57 U	0.59 U	0.62 U	0.49 U	0.36 U	0.39 U	0.46 U	0.65 U	0.43 U	0.39 U	0.48 U
Chromium	12.5	37.4	9.70	9.20	32.50	11.40	8.5	**10.8**	**7.8**	**9.2**	**5.60**	**5.20**
Cobalt	1.90	3.00	1.18 U	1.20 U	1.40	0.96	0.74	**5.7**	1.30 U	1.00	1.90	1.00 U
Copper	50.6	42.9	43.4	41.4	69.1	30.60	25.4	**60.5**	**73.2**	**69.8**	**41.9**	**103**
Lead	34.0	163	33.3	29.8	125	47.00	35.1	**12.1**	**5.00**	**3.00**	**2.50**	**3.50**
Mercury	0.088 U	0.096 U	0.101 U	0.105 U	0.085	0.096	0.0688	0.0836	0.112 U	0.0734 U	0.0669 U	0.0827 U
Nickel	4.00	5.80	1.47 U	0.73 U	2.30	2.50	2.2	**10.4** J	**2.00 J	**2.6** J	**4.1** J	1.40 J
Selenium	1.54 U	1.69 U	1.77 U	1.85 U	1.49 U	1.09 U	1.17 U	1.80 B	1.96 U	1.29 U	1.17 U	1.45 U
Silver	1.03 U	1.13 U	1.18 U	2.77 U	0.99 U	0.73 U	0.78 U	0.93 U	1.31 U	0.86 U	0.78 U	0.97 U
Thallium	2.31 U	2.55 U	2.65 U	9.80 U	2.23 U	1.63 U	1.76 U	2.09 U	2.94 U	1.93 U	1.76 U	2.18 U
Vanadium	17.7	14.2	9.90	60.4	14.3	7.40	6.1	**25.7**	**12.8**	**13.0**	**11.1**	**9.3**
Zinc	59.7	52.5	122	57.0	239	65.9	49.7	**43.8**	**91.3**	**62.9**	**42.7**	**37.40**
Titanium	92.0 J	125.00 J	52.0 J	4.00 J	62.0 J	64 J	60 J	**256** J	**79** J	**65.00** J	**91** J	**75** J
Tin	4.10	4.20	4.00	4.00 U	4.50	2.30	3.6	**2.6**	2.60	2.00	1.50	2.20

*SLG-32 16-18 is a field duplicate of SLG-2 16-18
*SLG-35 8-10 " " " SLG-5 8-10
*SLG-35 16-18 " " " SLG-5 16-18

Table 3-E: Total Sulfides

Sample Number	SLG-1 (10-12)	SLG-1 (24-26)	SLG-2 (16-18)	SLG-32 (16-18)*	SLG-2 (22-24)	SLG-3 (12-14)	SLG-3 (18-20)	SLG-4 (4-6)	SLG-4 (16-18)	SLG-5 (8-10)	SLG-5 (16-18)	WST-1
Units	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
Analyte	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q
Sulfide, Total	25.7 U	28.3 U	29.5 U	30.8 U	24.8 U	18.1 U	19.5 U	23.2 U	32.6 U	21.5 U	19.6 U	24.2 U

*SLG-32 16-18 is a field duplicate of SLG-2 16-18

Table 3-F: TCLP Metals

Sample Number	SLG-1 (2-4)	SLG-2 (0-2)	SLG-3 (24-26)	SLG-33 (24-26)*	SLG-4 (12-14)	SLG-5 (14-16)
Units	Mg/L	Mg/L	Mg/L	Mg/L	mg/L	mg/L
Analyte	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q
Arsenic	0.05 U	0.05 U	0.05 U	0.05 U	0.0500 U	0.0500 U
Barium	**0.61**	**0.70**	**0.57**	**0.48**	**0.56**	**0.47**
Cadmium	0.003 U	0.003 U	0.003 U	0.003 U	0.0030 U	0.0030 U
Chromium	0.005 U	0.006 B	0.005 U	0.005 U	0.0058	0.0055
Lead	0.05 U	0.05 U	0.059	0.059	0.0500 U	0.0500 U
Mercury	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U
Selenium	0.01 U	0.01 U	0.01 U	0.01 U	0.0100 U	0.0100 U
Silver	0.005 U	0.005 U	0.005 U	0.005 U	0.0050 U	0.0050 U

*SLG-33 24-26 is a field duplicate of SLG-3 24-26

TABLE 4
ANALYTICAL RESULTS FOR SOIL SAMPLES

Table 4-A: SVOCs

Sample Number	SS-1		SS-2	
Units	ug/Kg		ug/Kg	
Analyte	Result	Q	Result	Q
1,2-Dichlorobenzene	13,900	UD	102,000	UD
1,3-Dichlorobenzene	13,900	UD	102,000	UD
1,4-Dichlorobenzene	13,900	UD	102,000	UD
1,2,4-Trichlorobenzene	13,900	UD	102,000	UD
2,4,5-Trichlorophenol	69,400	UD	509,000	UD
2,4,6-Trichlorophenol	13,900	UD	102,000	UD
2,4-Dichlorophenol	13,900	UD	102,000	UD
2,4-Dimethylphenol	13,900	UD	102,000	UD
2,4-Dinitrophenol	69,400	UD	509,000	UD
2,4-Dinitrotoluene	13,900	UD	102,000	UD
2,6-Dinitrotoluene	13,900	UD	102,000	UD
2-Chloronaphthalene	13,900	UD	102,000	UD
2-Chlorophenol	13,900	UD	102,000	UD
2-Methylnaphthalene	13,900	UD	102,000	UD
2-Methylphenol	13,900	UD	102,000	UD
2-Nitroaniline	69,400	UD	509,000	UD
2-Nitrophenol	13,900	UD	102,000	UD
3,3'-Dichlorobenzidine	13,900	UD	102,000	UD
3-Nitroaniline	69,400	UD	509,000	UD
4,6-Dinitro-2-methylphenol	69,400	UD	509,000	UD
4-Bromophenyl phenyl ether	13,900	UD	102,000	UD
4-Chloro-3-methylphenol	27,300	UD	200,000	UD
4-Chloroanaline	13,900	UD	102,000	UD
4-Chlorophenyl phenyl ether	13,900	UD	102,000	UD
4-Methylphenol	13,900	UD	102,000	UD
4-Nitroaniline	69,400	UD	509,000	UD
4-Nitrophenol	13,900	UD	247,000	UD
Acenaphthene	13,900	UD	102,000	UD
Acenaphthylene	13,900	UD	102,000	UD
Anthracene	13,900	UD	102,000	UD
Benzo(a)anthracene	13,900	UD	102,000	UD
Benzo(a)pyrene	13,900	UD	102,000	UD
Benzo(b)fluoranthene	13,900	UD	102,000	UD
Benzo(g,h,i)perylene	13,900	UD	102,000	UD
Benzo(k)fluoranthene	13,900	UD	102,000	UD
Benzoic acid	33,600	UD	247,000	UD
Benzyl alcohol	27,300	UD	200,000	UD
Bis(2-chloroethoxy)methane	13,900	UD	102,000	UD
Bis(2-Chloroethyl)ether	13,900	UD	102,000	UD
Bis(2-Chloroisopropyl)ether	13,900	UDJ	102,000	UDJ

Table 4-A: SVOCs

Sample Number	SS-1		SS-2	
Units	ug/Kg		ug/Kg	
Analyte	Result	Q	Result	Q
Bis(2-ethylhexyl)phthalate	13,900	UD	102,000	UD
Butyl benzyl phthalate	13,900	UD	102,000	UD
Carbazole	13,900	UD	102,000	UD
Chrysene	13,900	UD	102,000	UD
Di-n-butyl phthalate	13,900	UD	102,000	UD
Di-n-octylphthalate	13,900	UD	102,000	UD
Dibenz(a,h) anthracene	13,900	UD	102,000	UD
Dibenzofuran	13,900	UD	102,000	UD
Diethyl phthalate	13,900	UD	102,000	UD
Dimethyl phthalate	13,900	UD	102,000	UD
Fluoranthene	13,900	UD	102,000	UD
Fluorene	13,900	UD	102,000	UD
Hexachlorobenzene	13,900	UD	102,000	UD
Hexachlorobutadiene	13,900	UD	102,000	UD
Hexachlorocyclopentadiene	13,900	UD	102,000	UD
Hexachloroethane	13,900	UD	102,000	UD
Indeno(1,2,3-CD)pyrene	13,900	UD	102,000	UD
Isophorone	13,900	UD	102,000	UD
N-Nitrosodi-n-propylamine	13,900	UD	102,000	UD
N-Nitrosodiphenylamine	13,900	UD	102,000	UD
Naphthalene	13,900	UD	102,000	UD
Nitrobenzene	13,900	UD	102,000	UD
Pentachlorophenol	69,400	UD	509,000	UD
Phenanthrene	13,900	UD	102,000	UD
Phenol	13,900	UD	102,000	UD
Pyrene	13,900	UD	102,000	UD

Table 4-B: PCBs

Sample Number	SS-1		SS-2	
Units	ug/kg		ug/kg	
Analyte	Result	Q	Result	Q
Aroclor 1016	213	U	154	U
Aroclor 1221	213	U	154	U
Aroclor 1232	213	U	154	U
Aroclor 1242	213	U	154	U
Aroclor 1248	213	U	154	U
Aroclor 1254	213	U	154	U
Aroclor 1260	213	U	154	U

TABLE 4
ANALYTICAL RESULTS FOR SOIL SAMPLES

Table 4-D: Appendix IX Metals

Sample Number	SS-1	SS-2
Units	mg/Kg	mg/Kg
Analyte	Result Q	Result Q
Antimony	4.30 UJ	3.10 UJ
Arsenic	5.20	9.60
Barium	355	84.7
Beryllium	1.20	1.50
Cadmium	0.92	**0.62 U**
Chromium	32.7	22.8
Cobalt	4.20	2.80
Copper	20.6	9.70
Lead	28.7	16.2
Mercury	**0.146 U**	0.187
Nickel	4.60 J	3.10 J
Selenium	**2.55 U**	**1.85 U**
Silver	**1.70 U**	**1.23 U**
Thallium	**3.83 U**	**2.78 U**
Vanadium	31.9	123
Zinc	179	44.5
Titanium	65.0 J	338 J
Tin	3.40	2.50

TABLE 5
ANALYTICAL RESULTS FOR SURFACE WATER AND SEDIMENT SAMPLES

Table 5-A: Surface Water VOCs

Sample Number	SW-1	SW-2	SW-3	SW-4	SW-5	SW-6	SW-7	SW-8	SW-10*
Units	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Analyte	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q
1,1,1,2-Tetrachloroethane	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
1,1,1-Trichloroethane	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
1,1,2,2-Tetrachloroethane	5.00 U	5.00 U	5.00 UJ	5.00 UJ	5.00 UJ	5.00 UJ	5.00 UJ	5.00 UJ	5.00 UJ
1,1,2-Trichloroethane	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
1,1-Dichlorethane	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
1,1-Dichloroethene	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
1,1-Dichloropropene	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
1,2,3-Trichlorobenzene	5.00 U	5.00 U	5.00 UJ	5.00 UJ	5.00 UJ	5.00 UJ	5.00 UJ	5.00 UJ	5.00 UJ
1,2,3-Trichloropropane	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
1,2,4-Trichlorobenzene	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
1,2,4-Trimethylbenzene	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
1,2-Dibromo-3-Chloropropane	25.0 U	25.0 U	25.0 UJ	25.0 UJ	25.0 UJ	25.0 UJ	25.0 UJ	25.0 UJ	25.0 UJ
1,2-Dibromoethane	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
1,2-Dichlorobenzene	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
1,2-Dichloroethane	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
1,2-Dichloropropane	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
1,3,5-Trimethylbenzene	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
1,3-Dichlorobenzene	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
1,3-Dichloropropane	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
1,4-Dichlorobenzene	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
2,2-Dichloropropane	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
2-Butanone	100 U	100 U	100 UJ	100 UJ	100 UJ	100 UJ	100 UJ	100 UJ	100 UJ
2-Chlorotoluene	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
2-Chloroethylvinyether	10.0 U	10.0 U	10.0 UJ	10.0 U	10.0 U	10.0 U	10.0 U	10.0 UJ	10.0 U
2-Hexanone	50.0 U	50.0 U	50.0 UJ	50.0 UJ	50.0 UJ	50.0 UJ	50.0 UJ	50.0 UJ	50.0 UJ
4-Chlorotoluene	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
4-Methyl-2-pentanone	100 U	100 U	100 UJ	100 U	100 U	100 U	100 U	100 UJ	100 U
Acetone	20.0 U	20.0 U	20.0 R	20.0 R	20.0 R	20.0 R	20.0 R	20.0 R	20.0 R
Acrylonitrile	5.00 R	5.00 R	5.00 R	5.00 R	5.00 R	5.00 R	5.00 R	5.00 R	5.00 R
Benzene	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
Bromobenzene	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
Bromochloromethane	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
Bromodichloromethane	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
Bromoform	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
Bromomethane	5.00 UJ	5.00 UJ	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
Carbon disulfide	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
Carbon tetrachloride	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
Chlorobenzene	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
Chloroethane	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
Chloroform	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
Chloromethane	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
Dibromochloromethane	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
Dibromomethane	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
Ethylbenzene	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U

Table 5-A: Surface Water VOCs

Sample Number	SW-1	SW-2	SW-3	SW-4	SW-5	SW-6	SW-7	SW-8	SW-10*
Units	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Analyte	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q
1,1,1,2-Tetrachloroethane	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
Iodomethane	5.00 UJ	5.00 UJ	5.00 UJ	5.00 UJ	5.00 UJ	5.00 UJ	5.00 UJ	5.00 UJ	5.00 UJ
Methylene Chloride	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
Styrene	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
Tetrachloroethene	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
Toluene	5.00 U	5.00 U	5.00 UJ	**15.4**	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
Trichloroethene	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
Trichlorofluoromethane	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
Vinyl acetate	50.0 U	50.0 U	50.0 UJ	50.0 U	50.0 U	50.0 U	50.0 U	50.0 UJ	50.0 U
Vinyl Chloride	2.00 U	2.00 U	2.00 UJ	2.00 U	2.00 U	2.00 U	2.00 U	2.00 UJ	2.00 U
cis-1,2-Dichloroethene	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
cis-1,3-Dichloropropene	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
m+p-Xylene	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
o-Xylene	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
trans-1,2-Dichloroethene	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
trans-1,3-Dichloropropene	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 UJ	5.00 U
trans-1,4-Dichloro-2-butene	100 UJ	100 UJ	100 UJ	100 U	100 U	100 U	100 U	100 UJ	100 U

*SW-10 is a field duplicate of SW-5

TABLE 5
ANALYTICAL RESULTS FOR SURFACE WATER AND SEDIMENT SAMPLES

Table 5-B: Surface Water Appendix IX Metals and Titanium

Sample Number	SW-1	SW-2	SW-4	SW-5	SW-6	SW-7	SW-10*	EB-01**
Analyte	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q
Units	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Antimony	30.0 U	30.0 U	30.0 U	30.0 U	30.0 U	30.0 U	30.0 U	30.0 U
Arsenic								
Barium	13.3	29.2	390	52.8	177	81.6	51.9	3.0 U
Beryllium	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Cadmium	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Chromium	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Cobalt	2.0 U	2.0 U	39.3	2.0 U	3.9 B	10.2	2.0 U	2.0 U
Copper	4.0 U	4.0 U	8.5 B	4.2 B	7.1 B	8.6 B	4.0 U	4.0 U
Lead	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	6.8	5.0 U	5.0 U
Mercury	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Nickel	6.4	7.3	53.4	4.1 B	14.6	26.0	5.8	4.0 U
Selenium	6.0 U	6.0 U	6.0 U	6.0 U	6.0 U	6.0 U	6.0 U	6.0 U
Silver	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Thallium	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U
V anadium	3.0 U	3.0 U	3.5 B	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U
Zinc	19.0 U	19.0 U	19.0 U	19.0 U	19.0 U	19.0 U	20.4	19.0 U
Tin	2.0 UJ	2.0 UJ	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U
Titanium	4.0 U	4.0 U	7.0	2.0 U	2.0 U	16.0	2.0 U	2.0 U

*SW-10 is a field duplicate of SW-5

**EB-01 is an equipment blank for equipment used to collect Sediment samples

Table 5-B: Surface Water Sulfides

Sample Number	SW-1	SW-2	SW-3	SW-4	SW-5	SW-6	SW-7	SW-8	SW-10*
Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Analyte	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q
Sulfide, Total	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U

*SW-10 is a field duplicate of SW-5

TABLE 5
ANALYTICAL RESULTS FOR SURFACE WATER AND SEDIMENT SAMPLES

Table5-C: SVOCs

Sample Number	SED-1		SED-2		SED-3		SED-4		SED-5		SED-6		SED-7		SED-8		SED-10*		EB-01**	
Units	mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		ug/L	
Analyte	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
1,2-Dichlorobenzene	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
1,3-Dichlorobenzene	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
1,4-Dichlorobenzene	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
1,2,4-Trichlorobenzene	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
2,4,5-Trichlorophenol	48,400	U	25,600	U	13,200	U	17,900	U	7,700	U	9,120	U	95,500	U	7,800	U	8,470	U	10,000	U
2,4,6-Trichlorophenol	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
2,4-Dichlorophenol	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
2,4-Dimethylphenol	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
2,4-Dinitrophenol	48,400	U	25,600	U	13,200	U	17,900	UJ	7,700	UJ	9,120	U	95,500	U	7,800	U	8,470	UJ	50,000	U
2,4-Dinitrotoluene	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
2,6-Dinitrotoluene	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
2-Chloronaphthalene	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
2-Chlorophenol	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
2-Methylnaphthalene	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
2-Methylphenol	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
2-Nitroanaline	48,400	U	25,600	U	13,200	U	17,900	U	7,700	U	9,120	U	95,500	U	7,800	U	8,470	U	50,000	U
2-Nitrophenol	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
3,3'-Dichlorobenzidine	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	20,000	U
3-Nitroanaline	48,400	U	25,600	U	13,200	U	17,900	U	7,700	U	9,120	U	95,500	U	7,800	U	8,470	U	50,000	U
4,6-Ditnitro-2-methylphenol	48,400	U	25,600	U	13,200	U	17,900	U	7,700	U	9,120	U	95,500	U	7,800	U	8,470	U	50,000	U
4-Bromophenyl Phenyl Ether	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
4-Chloro-3-methylphenol	19,100	U	10,100	U	5,210	U	7,070	U	3,030	U	3,590	U	37,600	U	3,070	U	3,340	U	20,000	U
4-Chloroanaline	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	20,000	U
4-Chlorophenyl Phenyl Ether	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
4-Methylphenol	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
4-Nitroanaline	48,400	U	25,600	U	13,200	U	17,900	UJ	7,700	UJ	9,120	U	95,500	U	7,800	U	8,470	UJ	50,000	U
4-Nitrophenol	23,500	U	12,400	U	6,410	U	8,700	U	3,740	U	4,420	U	46,300	U	3,780	U	4,110	U	50,000	U
Acenaphthene	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
Acenaphthylene	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
Anthracene	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
Benzo(a)Anthracene	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
Benzo(a)Pyrene	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
Benzo(b)Fluoranthene	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
Benzo(g,h,i)Perylene	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
Benzo(k)Fluoranthene	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
Benzoic acid	23,500	U	12,400	U	6,410	U	8,700	U	3,740	U	4,420	U	95,500	U	3,780	U	4,110	U	50,000	UJ
Benzyl Alcohol	19,100	U	10,100	U	5,210	U	7,070	U	3,030	U	3,590	U	37,600	U	3,070	U	3,340	U	20,000	U
Bis(2-Chloroethyl)ether	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	UJ

Table5-C: SVOCs

Sample Number	SED-1		SED-2		SED-3		SED-4		SED-5		SED-6		SED-7		SED-8		SED-10*		EB-01**	
Units	mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		ug/L	
Analyte	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Bis(2-Chloroisopropyl)ether	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
Bis(2-chloroethoxy)methane	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
Bis(2-ethylhexyl)phthalate	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
Butyl Benzyl Phthalate	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
Carbazole	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
Chrysene	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
Di-n-Butyl Phthalate	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
Di-n-octylphthalate	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
Dibenzo(a,h)Anthracene	9,690	UJ	5,120	UJ	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
Dibenzofuran	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
Diethyl Phthalate	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
Dimethyl Phthalate	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
Fluoranthene	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
Fluorene	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
Hexachlorobenzene	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
Hexachlorobutadiene	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
Hexachlorocyclopentadiene	9,690	U	5,120	U	2,650	U	3,590	UJ	1,540	UJ	1,820	U	1,910	U	1,560	U	1,690	UJ	10,000	U
Hexachloroethane	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
Indeno(1,2,3-CD)Pyrene	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
Isophorone	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
N-Nitroso-di-n-propylamine	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	UJ
N-Nitrosodiphenylamine	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
Naphthalene	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
Nitrobenzene	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
Pentachlorophenol	48,400	U	25,600	U	13,200	U	17,900	U	7,700	U	9,120	U	95,500	U	7,800	U	8,470	U	50,000	U
Phenanthrene	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
Phenol	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U
Pyrene	9,690	U	5,120	U	2,650	U	3,590	U	1,540	U	1,820	U	1,910	U	1,560	U	1,690	U	10,000	U

*SED-10 is a field duplicate of SED-5

**EB-01 is an equipment blank ifor equipment used to collect Sediment samples

TABLE 5
ANALYTICAL RESULTS FOR SURFACE WATER AND SEDIMENT SAMPLES

Table 5-D: PCBs

Sample Number	SED-1	SED-2	SED-3	SED-4	SED-5	SED-6	SED-7	SED-8	SED-10	EB-1**
Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/L
Analyte	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q
Aroclor 1016	245 U	259 U	802 U	1088 U	490 U	550 U	580 U	473 U	514 U	0.650 U
Aroclor 1221	245 U	259 U	802 U	1088 U	490 U	550 U	580 U	473 U	514 U	0.650 U
Aroclor 1232	245 U	259 U	802 U	1088 U	490 U	550 U	580 U	473 U	514 U	0.650 U
Aroclor 1242	245 U	259 U	802 U	1088 U	490 U	550 U	580 U	473 U	514 U	0.650 U
Aroclor 1248	245 U	259 U	802 U	1088 U	490 U	550 U	580 U	473 U	514 U	0.650 U
Aroclor 1254	245 U	259 U	802 U	1088 U	490 U	550 U	580 U	473 U	514 U	0.650 U
Aroclor 1260	245 U	259 U	802 U	1088 U	490 U	550 U	580 U	473 U	514 U	0.650 U

Note: all Reporting limits for the soil samples were corrected by a factor of times 2 to reflect the reporting limt from the blank.
** EB-01 is an equipment blank for equipment used to collect Sediment samples

Table 5-E: Appendix IX and Titanium

Sample Number	SED-1	SED-2	SED-3	SED-4	SED-5	SED-6	SED-7	SED-8	SED-10*
Analyte	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q
Units	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
Antimony	4.90 UJ	5.20 UJ	2.7 R	1.8 U	1.6 U	1.8 U	1.9 U	1.6 UR	1.7 U
Arsenic	2.40 U	2.60 U	**2.9**	**1.4**	0.8 U	0.9 U	**2.1**	0.8 U	0.9 U
Barium	**20.8**	**28.9**	**35.3 J**	**36.6 J**	**14.4 J**	**10.2 J**	**91.4 J**	**14.1 J**	**12.0 J**
Beryllium	**0.52**	**0.53**	**0.33**	0.18 U	0.16 U	0.18 U	0.19 U	0.16 U	0.17 U
Cadmium	0.98 U	1.04 U	0.53 U	0.36 U	0.33 U	0.37 U	0.39 U	0.32 U	0.34 U
Chromium	**5.20**	**5.90**	**6.9**	**5.9 J**	**1.9 J**	**2.4 J**	**7.1 J**	**2.7**	**1.9 J**
Cobalt	2.00 U	2.10 U	**2.5**	0.7 U	0.7 U	0.7 U	**2.1**	0.6 U	0.7 U
Copper	**7.20**	**6.30**	**5.6**	**2.0**	**1.4**	**4.0**	**3.7**	**1.2**	**1.0**
Lead	**5.40**	**9.10**	**7.9**	**5.7**	**5.8**	**7.4**	**6.1**	**3.2**	**5.0**
Mercury	0.167 U	0.177 U	0.091 U	**0.174**	0.0558 U	0.063 U	0.066 U	0.0539 U	0.059 U
Nickel	**4.90 J**	**4.80 J**	**3.1**	**2.0**	**0.87**	**0.9**	**2.0**	**1.30**	0.9 U
Selenium	2.94 U	3.11 U	1.60 U	1.09 U	0.98 U	1.11 U	1.16 U	0.95 U	1.03 U
Silver	1.96 U	2.07 U	1.07 U	0.73 U	0.65 U	0.74 U	0.77 U	0.63 U	0.68 U
Thallium	4.40 U	4.66 U	2.41 UJ	1.63 U	1.47 U	1.66 U	1.74 U	1.42 UJ	1.54 U
Vanadium	**7.10**	**9.00**	**12.5**	**5.0 J**	**4.0 J**	**3.4 J**	**21.2 J**	**5.0**	**4.1 J**
Zinc	**26.7**	**63.7**	**50.2 J**	**8.6**	**5.0**	**14.5**	**18.4**	**4.4 J**	**4.2**
Tin	**68.0 J**	**93.00 J**	**4.3**	2.2 U	1.6 U	1.9 U	2.1 U	2.5	2.0 U
Titanium	2.00 U	**2.20**	**123**	**91.0 J**	**57.0 J**	**64.0 J**	**111 J**	**92.0**	**85.0 J**

*SED-10 is a field duplicate of SED-5

Table 5-F: Sulfides

Sample Number	SED-1	SED-2
Units	mg/Kg	mg/Kg
Analyte	Result Q	Result Q
Sulfide, Total	48.90 U	51.80 U

TABLE 6
ANALYTICAL RESULTS FOR GROUND WATER SAMPLES

Table 6-A: VOCs

Sample Number	GW-1		GW-2		W-6		W-7		W-17	
Units	ug/L		ug/L		ug/L		ug/L		ug/L	
Analyte	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
1,1,1,2-Tetrachloroethane	5.00	U	5.00	U	5.00	U	5.00	U	5.00	U
1,1,1-Trichloroethane	5.00	U	5.00	U	5.00	U	5.00	U	5.00	U
1,1,2,2-Tetrachloroethane	5.00	U	5.00	U	5.00	U	5.00	U	5.00	U
1,1,2-Trichloroethane	5.00	U	5.00	U	5.00	U	5.00	U	5.00	U
1,1-Dichlorethane	5.00	U	5.00	U	5.00	U	5.00	U	5.00	U
1,1-Dichloroethene	5.00	U	5.00	U	5.00	U	5.00	U	5.00	U
1,1-Dichloropropene	5.00	U	5.00	U	5.00	U	5.00	U	5.00	U
1,2,3-Trichlorobenzene	5.00	U	5.00	U	5.00	U	5.00	U	5.00	U
1,2,3-Trichlorpropane	5.00	U	5.00	U	5.00	U	5.00	U	5.00	U
1,2,4-Trichlorobenzene	5.00	U	5.00	U	5.00	U	5.00	U	5.00	U
1,2,4-Trimethylbenzene	5.00	U	5.00	U	5.00	U	5.00	U	5.00	U
1,2-Dibromo-3-Chloropropane	25.0	U	25.0	U	25.0	U	25.0	U	25.0	U
1,2-Dibromoethane	5.00	U	5.00	U	5.00	U	5.00	U	5.00	U
1,2-Dichlorobenzene	5.00	U	5.00	U	5.00	U	5.00	U	5.00	U
1,2-Dichloroethane	5.00	U	5.00	U	5.00	U	5.00	U	5.00	U
1,2-Dichloropropane	5.00	U	5.00	U	5.00	U	5.00	U	5.00	U
1,3,5-Trimethylbenzene	5.00	U	5.00	U	5.00	U	5.00	U	5.00	U
1,3-Dichlorobenzene	5.00	U	5.00	U	5.00	U	5.00	U	5.00	U
1,3-Dichloropropane	5.00	U	5.00	U	5.00	U	5.00	U	5.00	U
1,4-Dichlorobenzene	5.00	U	5.00	U	5.00	U	5.00	U	5.00	U
2,2-Dichloropropane	5.00	U	5.00	U	5.00	U	5.00	U	5.00	U
2-Butanone	100	U	100	U	100	U	100	U	100	U
2-Chlorotoluene	5.00	U	5.00	U	5.00	U	5.00	U	5.00	U
2-Chloroethylvinyether	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
2-Hexanone	50.0	U	50.0	U	50.0	U	50.0	U	50.0	U
4-Chlorotoluene	5.00	U	5.00	U	5.00	U	5.00	U	5.00	U
4-Methyl-2-pentanone	100	U	100	U	100	U	100	U	100	U
Acetone	20.0	U	20.0	U	20.0	U	20.0	U	20.0	U
Acrylonitrile	5.00	R	5.00	R	5.00	R	5.00	R	5.00	R
Benzene	5.00	U	5.00	U	5.00	U	5.00	U	5.00	U
Bromobenzene	5.00	U	5.00	U	5.00	U	5.00	U	5.00	U
Bromochloromethane	5.00	U	5.00	U	5.00	U	5.00	U	5.00	U
Bromodichloromethane	5.00	U	5.00	U	5.00	U	5.00	U	5.00	U
Bromoform	5.00	U	5.00	U	5.00	U	5.00	U	5.00	U
Bromomethane	5.00	UJ	5.00	UJ	5.00	UJ	5.00	UJ	5.00	UJ
Carbon disulfide	5.00	U	5.00	U	5.00	U	5.00	U	5.00	U
Carbon tetrachloride	5.00	U	5.00	U	5.00	U	5.00	U	5.00	U
Chlorobenzene	5.00	U	5.00	U	5.00	U	5.00	U	5.00	U
Chloroethane	5.00	U	5.00	U	5.00	U	5.00	U	5.00	U
Chloroform	5.00	U	5.00	U	5.00	U	5.00	U	5.00	U
Chloromethane	5.00	U	5.00	U	5.00	U	5.00	U	5.00	U
Dibromochloromethane	5.00	U	5.00	U	5.00	U	5.00	U	5.00	U
Dibromomethane	5.00	U	5.00	U	5.00	U	5.00	U	5.00	U
Ethylbenzene	5.00	U	5.00	U	5.00	U	5.00	U	5.00	U
Iodomethane	5.00	UJ	5.00	UJ	5.00	UJ	5.00	UJ	5.00	UJ
Methylene Chloride	5.00	U	5.00	U	5.00	U	5.00	U	5.00	U

Table 6-A: VOCs

Sample Number	GW-1		GW-2		W-6		W-7		W-17	
Units	ug/L		ug/L		ug/L		ug/L		ug/L	
Analyte	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Styrene	5.00	U	5.00	U	5.00	U	5.00	U	5.00	U
Tetrachloroethene	5.00	U	5.00	U	5.00	U	5.00	U	5.00	U
Toluene	5.00	U	5.00	U	5.00	U	5.00	U	5.00	U
Trichloroethene	5.00	U	5.00	U	5.00	U	5.00	U	5.00	U
Trichlorofluoromethane	5.00	U	5.00	U	5.00	U	5.00	U	5.00	U
Vinyl acetate	50.0	U	50.0	U	50.0	U	50.0	U	50.0	U
Vinyl Chloride	2.00	U	2.00	U	2.00	U	2.00	U	2.00	U
cis-1,2-Dichloroethene	5.00	U	5.00	U	5.00	U	5.00	U	5.00	U
cis-1,3-Dichloropropene	5.00	U	5.00	U	5.00	U	5.00	U	5.00	U
m+p-Xylene	5.00	U	5.00	U	5.00	U	5.00	U	5.00	U
o-Xylene	5.00	U	5.00	U	5.00	U	5.00	U	5.00	U
trans-1,2-Dichloroethene	5.00	U	5.00	U	5.00	U	5.00	U	5.00	U
trans-1,3-Dichloropropene	5.00	U	5.00	U	5.00	UJ	5.00	UJ	5.00	UJ
trans-1,4-Dichloro-2-butene	100	UJ	100	UJ	100	U	100	U	100	U

*W-17 is a field duplicate of W-7

TABLE 6
ANALYTICAL RESULTS FOR GROUND WATER SAMPLES

Table 6-B: SVOCs

Sample Number	W-7		W-17*		EB-2**	
Units	ug/L		ug/L		ug/L	
Analyte	Result	Qual	Result	Qual	Result	Qual
1,2-Dichlorobenzene	10.0	U	10.0	U	10.0	U
1,3-Dichlorobenzene	10.0	U	10.0	U	10.0	U
1,4-Dichlorobenzene	10.0	U	10.0	U	10.0	U
1,2,4-Trichlorobenzene	10.0	U	10.0	U	10.0	U
2,4,5-Trichlorophenol	10.0	U	10.0	U	10.0	U
2,4,6-Trichlorophenol	10.0	U	10.0	U	10.0	U
2,4-Dichlorophenol	10.0	U	10.0	U	10.0	U
2,4-Dimethylphenol	10.0	U	10.0	U	10.0	U
2,4-Dinitrophenol	50.0	U	50.0	U	50.0	U
2,4-Dinitrotoluene	10.0	U	10.0	U	10.0	U
2,6-Dinitrotolune	10.0	U	10.0	U	10.0	U
2-Chloronaphthalene	10.0	U	10.0	U	10.0	U
2-Chlorophenol	10.0	U	10.0	U	10.0	U
2-Methylnaphthalene	10.0	U	10.0	U	10.0	U
2-Methylphenol	10.0	U	10.0	U	10.0	U
2-Nitroanaline	50.0	U	50.0	U	50.0	U
2-Nitrophenol	10.0	U	10.0	U	10.0	U
3,3'-Dichlorobenzidine	20.0	U	20.0	U	20.0	U
3-Nitroanaline	50.0	U	50.0	U	50.0	U
4,6-Ditnitro-2-methylphenol	50.0	U	50.0	U	50.0	U
4-Bromophenyl Phenyl Ether	10.0	U	10.0	U	10.0	U
4-Chloro-3-methylphenol	20.0	U	20.0	U	20.0	U
4-Chloroanaline	20.0	U	20.0	U	20.0	U
4-Chlorophenyl Phenyl Ether	10.0	U	10.0	U	10.0	U
4-Methylphenol	10.0	U	10.0	U	10.0	U
4-Nitroanaline	50.0	UJ	50.0	UJ	50.0	U
4-Nitrophenol	50.0	U	50.0	U	50.0	U
Acenaphthene	10.0	U	10.0	U	10.0	U
Acenaphthylene	10.0	U	10.0	U	10.0	U
Anthracene	10.0	U	10.0	U	10.0	U
Benzo(a)Anthracene	10.0	U	10.0	U	10.0	U
Benzo(a)Pyrene	10.0	U	10.0	UJ	10.0	U
Benzo(b)Fluoranthene	10.0	U	10.0	UJ	10.0	U
Benzo(g,h,i)Perylene	10.0	U	10.0	UJ	10.0	U
Benzo(k)Fluoranthene	10.0	U	10.0	UJ	10.0	U
Benzoic acid	50.0	U	50.0	U	50.0	U
Benzyl Alcohol	20.0	U	20.0	U	20.0	U
Bis(2-Chloroethyl)ether	10.0	UJ	10.0	UJ	10.0	U
Bis(2-Chloroisopropyl)ether	10.0	U	10.0	U	10.0	U
Bis(2-chloroethoxy)methane	10.0	U	10.0	U	10.0	U
Bis(2-ethylhexyl)phthalate	10.0	UJ	10.0	UJ	10.0	U
Butyl Benzyl Phthalate	10.0	UJ	10.0	UJ	10.0	U
Carbazole	10.0	U	10.0	U	10.0	U
Chrysene	10.0	U	10.0	U	10.0	U
Di-n-Butyl Phthalate	10.0	U	10.0	U	10.0	U
Di-n-octylphthalate	10.0	U	10.0	UJ	10.0	U
Dibenzo(a,h)Anthracene	10.0	U	10.0	UJ	10.0	U
Dibenzofuran	10.0	U	10.0	U	10.0	U
Diethyl Phthalate	10.0	U	10.0	U	10.0	U
Dimethyl Phthalate	10.0	U	10.0	U	10.0	U
Fluoranthene	10.0	U	10.0	U	10.0	U
Fluorene	10.0	U	10.0	U	10.0	U

Table 6-B: SVOCs

Sample Number	W-7	W-17*	EB-2**
Units	ug/L	ug/L	ug/L
Analyte	Result Qual	Result Qual	Result Qual
1,2-Dichlorobenzene	10.0 U	10.0 U	10.0 U
Hexachlorobenzene	10.0 U	10.0 U	10.0 U
Hexachlorobutadiene	10.0 U	10.0 U	10.0 U
Hexachlorocyclopentadiene	10.0 U	10.0 U	10.0 U
Hexachloroethane	10.0 U	10.0 U	10.0 U
Indeno(1,2,3-CD)Pyrene	10.0 U	10.0 UJ	10.0 U
Isophorone	10.0 U	10.0 U	10.0 U
N-Nitroso-di-n-propylamine	10.0 U	10.0 U	10.0 U
N-Nitrosodiphenylamine	10.0 U	10.0 U	10.0 U
Naphthalene	10.0 U	10.0 U	10.0 U
Nitrobenzene	10.0 U	10.0 U	10.0 U
Pentachlorophenol	50.0 U	50.0 U	50.0 U
Phenanthrene	10.0 U	10.0 U	10.0 U
Phenol	10.0 U	10.0 U	10.0 U
Pyrene	10.0 U	10.0 U	10.0 U

*W-17 is a field duplicate of W-7

**EB-2 is an equipment blank for equipment used to collect ground water samples

TABLE 6
ANALYTICAL RESULTS FOR GROUND WATER SAMPLES

Table 6-C: PCBs

Sample Number	GW-1		GW-2		W-7		W-17*		EB-2**	
Units	ug/L		ug/L		ug/L		ug/L		ug/L	
Analyte	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Aroclor 1016	0.650	U	0.650	U	0.650	U	0.650	U	0.650	U
Aroclor 1221	0.650	U	0.650	U	0.650	U	0.650	U	0.650	U
Aroclor 1232	0.650	U	0.650	U	0.650	U	0.650	U	0.650	U
Aroclor 1242	0.650	U	0.650	U	0.650	U	0.650	U	0.650	U
Aroclor 1248	0.650	U	0.650	U	0.650	U	0.650	U	0.650	U
Aroclor 1254	0.650	U	0.650	U	0.650	U	0.650	U	0.650	U
Aroclor 1260	0.650	U	0.650	U	0.650	U	0.650	U	0.686	N

*W-17 is a field duplicate of W-7

**EB-2 is an equipment blank for equipment used to collect ground water samples

TABLE 6
ANALYTICAL RESULTS FOR GROUND WATER SAMPLES

Table 6-D: Appendix IX Metals and Titanium

Sample Number	GW-1		GW-2		W-6		W-7		W-17		EB-2**		EB-3***	
Units	ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L	
Analyte	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Antimony	30.0	U	30.0	U	30.0	U	30.0	U	30.0	U	30.0	U	30.0	U
Barium 100 mg/L	131		570		65.6		76.3		75.7		3.0	U	3.0	U
Beryllium	1.0	U	2.2		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
Cadmium 1 mg/L	2.0	U	2.0		2.0	U	2.0	U	2.0	U	2.0	U	2.0	U
Chromium 5 mg/L	45.4		69.7		3.6		3.0		2.6		2.0	U	2.0	U
Cobalt	2.0	U	14.2		2.2		3.3		4.3		2.0	U	2.0	U
Copper	18.1		21.9		4.6		4.1		4.1		4.0	U	4.0	
Lead 5mg/L	5.0	U	50.5		5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Mercury .2 mg/L	0.2		0.4		0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Nickel	7.7		27.8		7.0		11.5		12.3		4.0	U	4.0	U
Selenium 1 mg/L	6.0	U	6.0	U	6.0	U	6.0	U	6.0	U	6.0	U	6.0	U
Silver 5 mg/L	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U
Thallium	8.0	U	8.0	U	8.0	U	8.0	U	8.0	U	8.0	U	8.0	U
Vanadium	44.7		216		4.6		3.5		3.9		3.0	U	3.0	UJ
Zinc	19.0	U	95.7		19.0	U	19.0	U	19.0	U	19.0	U	19.0	U
Titanium	963	J	1140	J	61.8	J	57.8	J	38.3	J	2.0	UJ	2.0	U
Tin	4.0	U	5.9		4.0	U	4.0	U	4.0	U	4.0	U	4.0	U

**EB-2 is an equipment blank for equipment used to collect ground water samples
***EB-3 is an equipment blank for equipment used to collect surface water samples

Table 6-E: Sulfides, Nitrates, Nitrites

Sample Number	GW-1		GW-2		W-7		W-17		EB-3**		EB-2***	
Units	mg/L		mg/L		mg/L		mg/L		mg/L		mg/L	
Analyte	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Nitrite-Nitrogen	0.010	U	0.010	U	0.010	U	0.010	U	NA		NA	
Nitrate-Nitrogen	**0.480**	**J**	**0.496**	**J**	**581**	**J**	**0.141**	**J**	NA		NA	
Sulfide, Total	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U

**EB-2 is an equipment blank for equipment used to collect ground water samples
***EB-3 is an equipment blank for equipment used to collect surface water samples

TABLE 7
QC SAMPLE VOC RESULTS

Sample Number	TB-1	TB-2 (Trip Blank)	EB-2*	EB-3**
Units	ug/L	ug/L	ug/L	ug/L
Analyte	Result Q	Result Q	Result Q	Result Q
1,1,1,2-Tetrachloroethane	5.00 U	5.00 UJ	5.00 U	5.00 U
1,1,1-Trichloroethane	5.00 U	5.00 UJ	5.00 U	5.00 U
1,1,2,2-Tetrachloroethane	5.00 UJ	5.00 UJ	5.00 U	5.00 U
1,1,2-Trichloroethane	5.00 U	5.00 UJ	5.00 U	5.00 U
1,1-Dichlorethane	5.00 U	5.00 UJ	5.00 U	5.00 U
1,1-Dichloroethene	5.00 U	5.00 UJ	5.00 U	5.00 U
1,1-Dichloropropene	5.00 U	5.00 UJ	5.00 U	5.00 U
1,2,3-Trichlorobenzene	5.00 UJ	5.00 UJ	5.00 U	5.00 U
1,2,3-Trichloropropane	5.00 U	5.00 UJ	5.00 U	5.00 U
1,2,4-Trichlorobenzene	5.00 U	5.00 UJ	5.00 U	5.00 U
1,2,4-Trimethylbenzene	5.00 U	5.00 UJ	5.00 U	5.00 U
1,2-Dibromo-3-Chloropropane	25.0 UJ	25.0 UJ	25.0 U	25.0 U
1,2-Dibromoethane	5.00 U	5.00 UJ	5.00 U	5.00 U
1,2-Dichlorobenzene	5.00 U	5.00 UJ	5.00 U	5.00 U
1,2-Dichloroethane	5.00 U	5.00 UJ	5.00 U	5.00 U
1,2-Dichloropropane	5.00 U	5.00 UJ	5.00 U	5.00 U
1,3,5-Trimethylbenzene	5.00 U	5.00 UJ	5.00 U	5.00 U
1,3-Dichlorobenzene	5.00 U	5.00 UJ	5.00 U	5.00 U
1,3-Dichloropropane	5.00 U	5.00 UJ	5.00 U	5.00 U
1,4-Dichlorobenzene	5.00 U	5.00 UJ	5.00 U	5.00 U
2,2-Dichloropropane	5.00 U	5.00 UJ	5.00 U	5.00 U
2-Butanone	100 UJ	100 UJ	100 U	100 U
2-Chlorotoluene	5.00 U	5.00 UJ	5.00 U	5.00 U
2-Chloroethylvinyether	10.0 U	10.0 UJ	10.0 U	10.0 U
2-Hexanone	50.0 UJ	50.0 UJ	50.0 U	50.0 U
4-Chlorotoluene	5.00 U	5.00 UJ	5.00 U	5.00 U
4-Methyl-2-pentanone	100 U	100 UJ	100 U	100 U
Acetone	20.0 R	20.0 R	20.0 U	20.0 U
Acrylonitrile	5.00 R	5.00 R	5.00 R	5.00 R
Benzene	5.00 U	5.00 UJ	5.00 U	5.00 U
Bromobenzene	5.00 U	5.00 UJ	5.00 U	5.00 U
Bromochloromethane	5.00 U	5.00 UJ	5.00 U	5.00 U
Bromodichloromethane	5.00 U	5.00 UJ	5.00 U	5.00 U
Bromoform	5.00 U	5.00 UJ	5.00 U	5.00 U
Bromomethane	5.00 U	5.00 UJ	5.00 UJ	5.00 UJ
Carbon disulfide	5.00 U	5.00 UJ	5.00 U	5.00 U
Carbon tetrachloride	5.00 U	5.00 UJ	5.00 U	5.00 U
Chlorobenzene	5.00 U	5.00 UJ	5.00 U	5.00 U
Chloroethane	5.00 U	5.00 UJ	5.00 U	5.00 U
Chloroform	5.00 U	5.00 UJ	5.00 U	5.00 U
Chloromethane	5.00 U	5.00 UJ	5.00 U	5.00 U

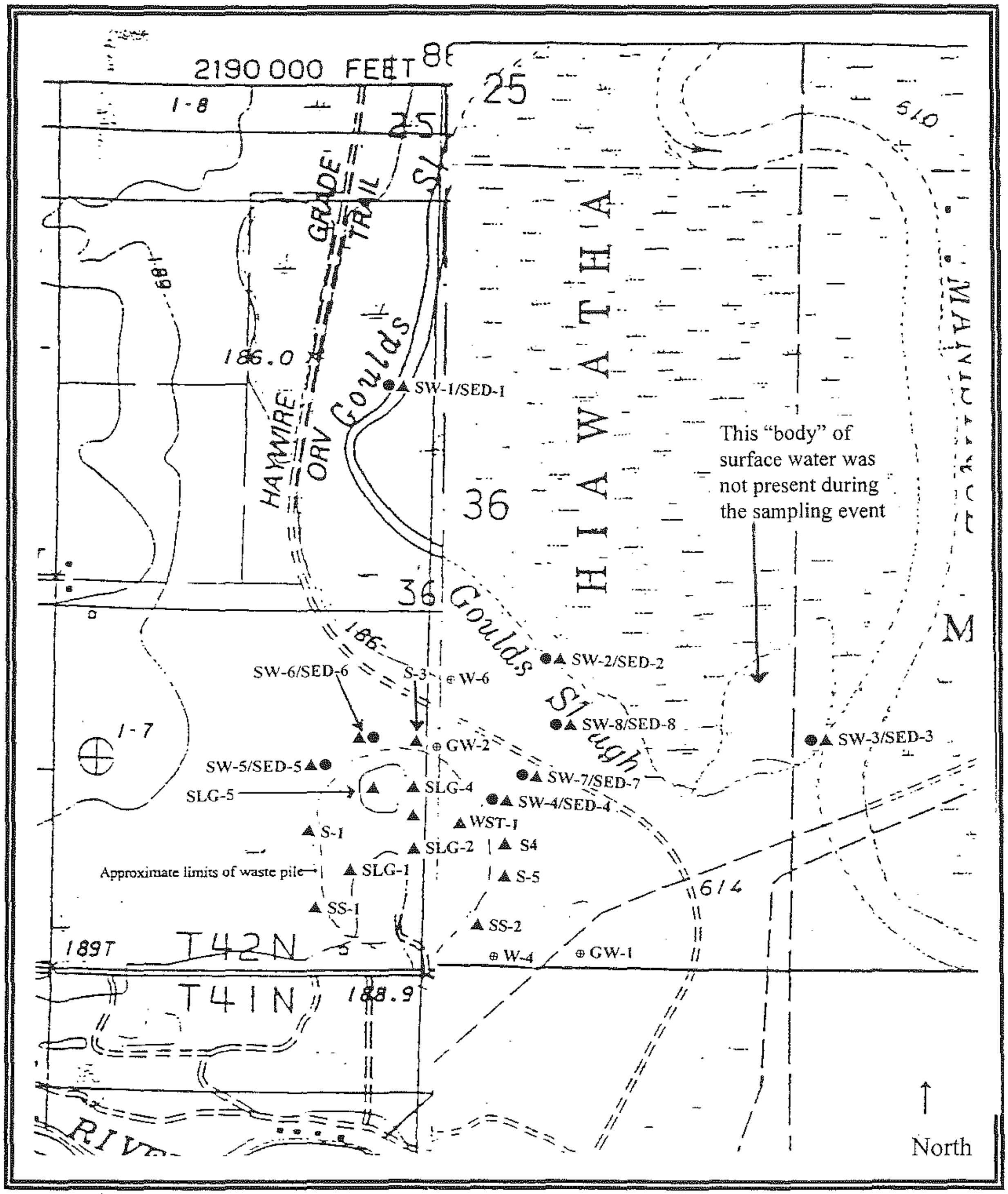
Sample Number	TB-1	TB-2 (Trip Blank)	EB-2*	EB-3**
Units	ug/L	ug/L	ug/L	ug/L
Analyte	Result Q	Result Q	Result Q	Result Q
Dibromochloromethane	5.00 U	5.00 UJ	5.00 U	5.00 U
Dibromomethane	5.00 U	5.00 UJ	5.00 U	5.00 U
Ethylbenzene	5.00 U	5.00 UJ	5.00 U	5.00 U
Iodomethane	5.00 UJ	5.00 UJ	5.00 UJ	5.00 UJ
Methylene Chloride	5.00 U	5.00 UJ	20.6	18.7
Styrene	5.00 U	5.00 UJ	5.00 U	5.00 U
Tetrachloroethene	5.00 U	5.00 UJ	5.00 U	5.00 U
Toluene	5.00 U	5.00 UJ	5.00 U	5.00 U
Trichloroethene	5.00 U	5.00 UJ	5.00 U	5.00 U
Trichlorofluoromethane	5.00 U	5.00 UJ	5.00 U	5.00 U
Vinyl acetate	50.0 U	50.0 UJ	50.0 U	50.0 U
Vinyl Chloride	2.00 U	2.00 UJ	2.00 U	2.00 U
cis-1,2-Dichloroethene	5.00 U	5.00 UJ	5.00 U	5.00 U
cis-1,3-Dichloropropene	5.00 U	5.00 UJ	5.00 U	5.00 U
m+p-Xylene	5.00 U	5.00 UJ	5.00 U	5.00 U
o-Xylene	5.00 U	5.00 UJ	5.00 U	5.00 U
trans-1,2-Dichloroethene	5.00 U	5.00 UJ	5.00 U	5.00 U
trans-1,3-Dichloropropene	5.00 U	5.00 UJ	5.00 UJ	5.00 UJ
trans-1,4-Dichloro-2-butene	100 U	100 UJ	100 U	100 U

*EB-2 is an equipment blank for ground water samples

**EB-3 is an equipment blank for surface water samples

Vinyl Chloride = 2 mg/l

FIGURE 1: FIELD SKETCH OF SAMPLE LOCATIONS



Note: Sample locations not to scale

APPENDIX A

PHOTOGRAPH LOG

Manistique Papers, Inc.
Residuals Management Area
November 17- 20, 1997

Photo No.: RY-1 Time: 1040
Date: 11/18/97 Direction: E

Description: View of sampling location SW-4/Sed-4. The RMA waste pile is visible in the background.

Photo No.: RY-2
Date: 11/18/97

Time: 1215
Direction: SW

Description: Close-up of sampling location SW-7/Sed-7, adjacent to the access road to the northeast of the RMA.

Photo No.: RY-3
Date: 11/18/97

Time: 1216
Direction: SW

Description: Panoramic view of sampling location SW-7/Sed-7. The RMA waste pile is visible in the background, beyond the vegetation.

Photo No.: RY-4
Date: 11/18/97

Time: 1410
Direction: SW

Description: View showing sampling location SW-8/Sed-8. The samples were collected from underneath the ice in the area near the red cooler. The RMA waste pile is visible in the background.

Photo No.: RY-5
Date: 11/18/97

Time: 1620
Direction: S

Description: Overview of sampling location SW-3/Sed-3. The water was clear and flowing at this location.

Photo No.: RY-6, 7 and 8
Date: 11/19/97
NE, E, SE

Time: 1020
Direction:

Description: Panoramic view of sampling location for SW-2/Sed-2, with Gould's Slough in the background.

Photo No.: RY-9
Date: 11/19/97

Time: 1120
Direction: S

Description: Overview of background surface water/sediment sampling location SW-1/Sed-1. The samples were collected upstream of Gould's Slough.

Photo No.: RY-10 and 11
Date: 11/19/97

Time: 1145
Direction: W

Description: Panoramic view of eastern half of the RMA waste pile where active dumping is occurring.

Photo No.: RY-12
Date: 11/19/97

Time: 1600
Direction: S

Description: View showing sampling location for GW-2 (white PVC pipe) with the RMA waste pile in the background.

Photo No.: RY-13 Time: 0920
Date: 11/20/97 Direction: N

Description: View from the top of the RMA waste pile showing the sampling location for SW-5/Sed-5 (ponded water at the base of the slope), which was in the northwest corner of the RMA.

Photo No.: RY-14
Date: 11/20/97

Time: 0945
Direction: E

Description: View of the location at the base of the western side of the RMA waste pile from which the surface soil sample SS-1 was collected. The hand auger marks the exact sampling location.

Photo No.: RY-15
Date: 11/20/97

Time: 1005
Direction: W

Description: View of location at the base of the RMA waste pile showing the sampling location for surface soil sample SS-2. The location is near the southeastern corner of the waste pile, and the exact sampling location is marked by the hand auger.

Photo No.: RY-16
Date: 11/20/97

Time: 1025
Direction: SW

Description: View showing sampling location for groundwater sample W-7. The TechLaw sampler is dropping the bailer into the water well.

Photo No.: RY-16A
Date:

Time:
Direction:

Description: This photograph was inadvertently taken while exiting the sampling location, so it was not registered in the field logbook.

Photo No.: RY-17 Time: 1230
Date: 11/20/97 Direction: S

Description: View of the RMA waste pile showing the piles from which the freshly dumped sludge sample WST-1 was collected. The sample was collected from the waste pile in the foreground.

Photo No.: RY-18
Date: 11/20/97

Time: 1305
Direction: W

Description: Close-up view of the drums containing Investigation Derived Wastes (IDW) that were left onsite by the Field Team.

Photo No.: RY-19
Date: 11/20/97

Time: 1306
Direction: NW

Description: View showing entrance gate into the RMA area. Also visible on the west side of the gate in the background are drums containing IDW material.

Photo No.: 1-1 | Time: 1020
Date: 11/17/97 | Direction: N

Description: View showing orange flag marking the location of sampling location for SW-6/Sed-6. Also visible are members of the Field Team.

Photo No.: 1-2
Date: 11/17/97

Time: 1600
Direction: N

Description: View showing sampling location for SW-5/Sed-5 (and associated field duplicates). The orange pipe near the pipe in the center of the photograph marks the sampling location.

Photo No.: 1-3
Date: 11/17/97

Time: 1604
Direction: NW

Description: Close-up view of sampling location for SW-5/Sed-5 and associated field duplicates.

Photo No.: 1-4
Date: 11/17/97

Time: 1623
Direction: W

Description: View showing sampling location for SW-6/Sed-6 and associated Matrix Spikes/Matrix Spike Duplicates. The sampling team broke through an ice cover in order to collect the samples from the area to the right of the flag.

Photo No.: 2-1
Date: 11/18/97

Time: 1215
Direction: SW

Description: View showing boring location for the SLG-1 sludge pile sample to the left of the vehicles.

Photo No.: 2-2
Date: 11/18/97

Time: 1216
Direction: SW

Description: Close-up view of boring location for SLG-1 sludge pile sample. Boring location is in the bottom center portion of the photograph.

Photo No.: 2-3
Date: 11/18/97

Time: 1330
Direction: S

Description: View of abandoned sampling location for SLG-2 sludge sample. The main gate entrance into the RMA area is visible in the background.

Photo No.: 2-4
Date: 11/18/97

Time: 1340
Direction: W

Description: View of abandonned SLG-2 sampling location.

Photo No.: 2-5
Date: 11/18/97

Time: 1410
Direction: S

Description: View of the sampling location for the SLG-2 sludge sample. The main gate entrance to the RMA is visible in the background.

Photo No.: 2-6
Date: 11/18/97

Time: 1538
Direction: N

Description: View facing north of sampling location for SLG-3 sludge sample.

Photo No.: 2-7
Date: 11/18/97

Time: 1538
Direction: E

Description: View of the sampling location for SLG-3 sludge sample.

Photo No.: 2-8
Date: 11/19/97

Time: 1115
Direction: NW

Description: Overview of the sampling location for the SLG-5 sludge sample.

Photo No.: 2-9
Date: 11/18/97

Time: 1117
Direction: N

Description: View of sampling location for SLG-5 sludge sample.

Photo No.: 2-10
Date: 11/20/97

Time: 1210
Direction: S

Description: View of groundwater monitoring well No.6 (W-6).

Photo No.: 3-1
Date: 11/19/97

Time: 1430
Direction: ESE

Description: View showing groundwater monitoring Well No. 4 and the replacement Well No.4 in the foreground. The sampling point for monitoring Well No.1 (W-1) is visible in the center. Visible in the background is the geoprobe, which is at sampling location GW-1.

Photo No.: 3-2
Date: 11/18/97

Time: 1431
Direction: E

Description: View showing groundwater showing location GW-1, which was located approximately 50 feet east of Well No.4 on Frankovich Road. The photograph was taken prior to purging activities.

APPENDIX B

FIELD LOGS

Manistique Papers, Inc.
Residuals Management Area
November 17- 20, 1997

APPENDIX B

FIELD LOGS

Manistique Papers, Inc.
Residuals Management Area
November 17- 20, 1997

CM

MEASUREMENT CONVERSIONS

IF YOU KNOW	MULTIPLY BY	TO FIND
LENGTH		
inches	2.540	centimeters
feet	30.480	centimeters
yards	0.914	meters
miles	1.609	kilometers
millimeters	0.039	inches
centimeters	0.393	inches
meters	3.280	feet
meters	1.093	yards
kilometers	0.621	miles
WEIGHT		
ounces	28.350	grams
pounds	0.453	kilograms
grams	0.035	ounces
kilograms	2.204	pounds
VOLUME		
fluid ounces	29.573	milliliters
pints	0.473	liters
quarts	0.946	liters
gallons (U.S.)	3.785	liters
milliliters	0.033	fluid ounces
liters	1.056	quarts
liters	0.264	gallons (U.S.)

TEMPERATURE

°C = (°F - 32) x .555
°F = (°C x 1.8) + 32

Inches	Decimals of foot	Milli-meters
1/16	.0052	1.5875
1/8	.0104	3.1750
3/16	.0156	4.7625
1/4	.0208	6.3500
5/16	.0260	7.9350
3/8	.0313	9.5250
1/2	.0417	12.700
5/8	.0521	15.875
3/4	.0625	19.050
7/8	.0729	22.225
1"	.0833	25.400
2"	.1667	50.800
3"	.2500	76.200
4"	.3333	101.60
5"	.4167	127.00
6"	.5000	152.40
7"	.5833	177.80
8"	.6667	203.20
9"	.7500	228.60
10"	.8333	254.00
11"	.9167	279.40
1 foot	1.0000	304.80

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RESIDUALS MANAGEMENT UNIT (RMA)
SAMPLING EVENT

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CONTENTS

PAGE	REFERENCE	DATE

11/13/97

(1)

1420: ROB YOUNG RECEIVES 20 COOLERS FROM KENNY MANSFIELD OF INTERTEK TESTING SERVICES. THE COOLERS WERE SHIPPED VIA FEDERAL EXPRESS. ALL CUSTODY SEALS WERE INITIALED BY "KM", DATED AND ARRIVED UNALTERED, I.E., ALL CUSTODY SEALS WERE INTACT AND ATTACHED UPON ARRIVAL AT THE TECHLAW OFFICES.

11/13/97

11/14/97 (2)

1130: YOUNG OPENS COOLERS TO ORGANIZE THE SAMPLE CONTAINERS FOR THE PROPOSED 11/17/97 SAMPLING AT THE MANISTIQUE RESIDUALS MANAGEMENT AREA (RMA) OUTSIDE MANASTIQUE, MI.

SAMPLE CONTAINERS ARE PLACED INTO VARIOUS COOLERS PER SAMPLE LOCATION. NO BROKEN OR FAULTY CONTAINERS ARE IDENTIFIED.

11/14/97

11/17/97 (3)

0810: YOUNG, TODD QUILLAN AND MARK ATTANASOFF MEET DIANE SHARROW TO DRIVE TO THE MANISTIQUE PAPER RMA. HIGGINS AND MUBIRU PERFORM DECONTAMINATION OF SAMPLING EQUIPMENT. AUGERS, STAINLESS STEEL BOWLS + SPOONS AND BAILERS ARE DECONTAMINATED IN THE FOLLOWING MANNER:

1. WASH w/ ALCONOX/TAP WATER
2. RINSE w/ DEIONIZED WATER
3. DOUBLE RINSE w/ DI WATER
4. LET EQUIPMENT AIR DRY
5. WRAP IN ALUMINUM FOIL

0825: WEATHER IS PARTLY CLOUDY TO CLOUDY. TEMPERATURES ARE COLD AT ~ 20°F.

11/17/97

(4)

0830: SHARROW, YOUNG, QUILLON, ATTANASOFF MEET JIM COOK OF MANISTIQUE PAPERS (MP), WHO GRANTS THE SAMPLING TEAM ACCESS TO THE RMA. MP USES BITTNER ENGINEERING, INC. (BEI) AS A CONSULTANT WHO WILL SPLIT SAMPLES.

COOK INDICATES THAT TELEPHONE LINES ARE BURIED WITHIN THE RMA. THEY RUN ALONG THE ACCESS ROADS RUNNING OVER THE TOP OF THE RMA.

CLAYTON EBSCH WILL REPRESENT MP DURING THE SAMPLING VISIT. MR. EBSCH IS WITH BEI. MP WISHES TO SPLIT EACH SAMPLE LOCATION WITH US EPA.

11/17/97

(5)

0855: ARRIVE AT RMA. SET-UP DECONTAMINATION/WORK AREA ON SOUTH END (OFF-OF) RMA. SEE THE SITE MAP FOR THE LOCATION

0930: PERFORM RECONNAISSANCE OF THE RMA AND SURROUNDING AREA. LAY-OUT SAMPLE LOCATIONS FOR SURFACE WATER, SOIL + SEDIMENT SAMPLES.

1100: HIGGINS AND MUBIRY PERFORM IMMUNOASSAY ON SOIL SAMPLES S1 THROUGH S5. FIRST, THEY WILL COLLECT THE SAMPLES, AND PERFORM THE IMMUNOASSAY AFTER LUNCH.

1100: YOUNG, QUILLON, SHARROW, ATTANASOFF AND EBBY CONTINUE RECON. IN WETLANDS AREA TO N AND NE OF THE RMA.

11/17/97

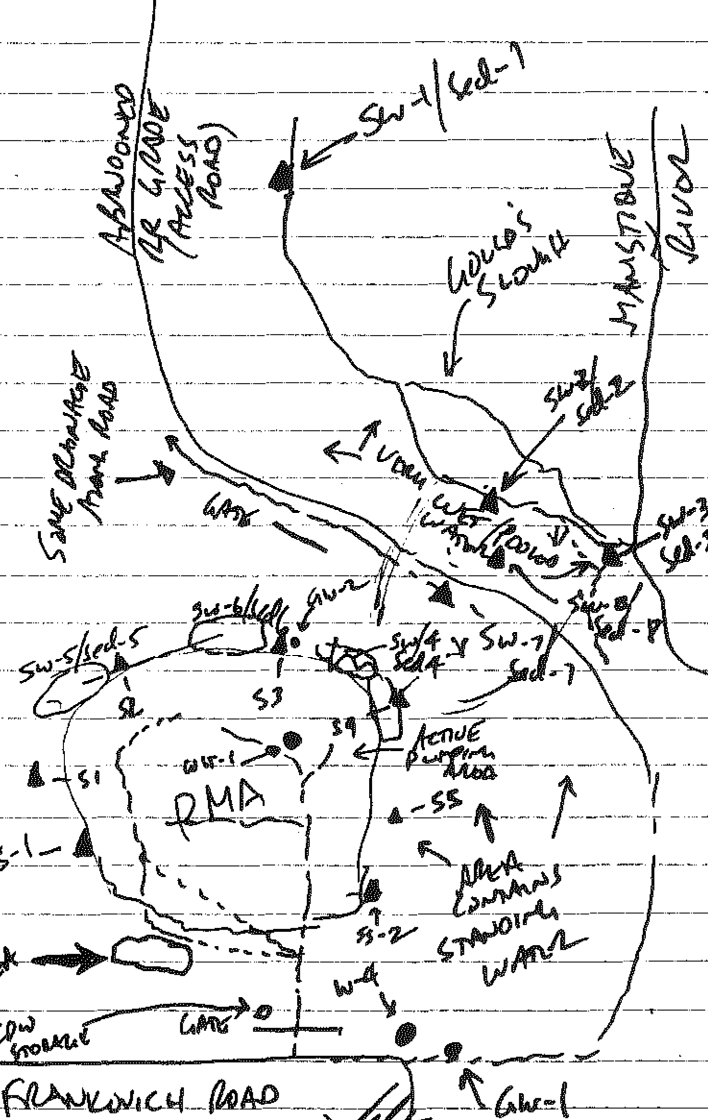
THE SURFACE WATER RUNOFF FROM THE RMA IS POOLED AT THE BASE OF THE RMA IN SEVERAL AREAS. YOUNG AND ATTANASOFF LAY-OUT SW-5/SED-5 ALONG THE NORTHWEST PORTION OF THE RMA. SW-6/SED-6 IS LAYED OUT ALONG THE NORTHERN PERIMETER OF THE RMA. THE TWO LOCATIONS ARE REPORTED BY MP REPRESENTATIVE JIM COOK TO BE HYDRAULICALLY CONNECTED BY A LARGE (~18") PVC PIPE, WHICH RUNS UNDER THE TOE OF THE N-NW PORTION OF THE RMA -- SEE FIGURE ON PAGE 7.

SURFACE SOIL SAMPLES S1-S5 ARE ALSO LAYED OUT FOR SUBSEQUENT PCB IMMUNOASSAY SAMPLE COLLECTION.

THERE ARE WETLANDS/POOLED WATER IN AREAS TO THE N, NE AND NW OF THE RMA -- SEE FIGURE ON PAGE 7

11/17/91

GENERAL CONFIGURATIONS OF AREAS SURROUNDING RMA



11/17/91

11/17/97 (8)

1230: BREAK FOR LUNCH.

1345: RETURN FROM LUNCH.
: EBBSH REQUESTS THAT HE BE ABLE TO COLLECT SPLITS WITH ONLY ONE GROUP. THEREFORE, THE SAMPLING TEAM WILL NOT SPLIT INTO TWO GROUPS.

1430: YOUNG, QUILLEN AND ATHANASOFF MOVE TO LOCATION SW-5/Sed-5 TO COLLECT SURFACE WATER + SED'T SAMPLES. A DUPLICATE (SW-10/Sed-10) WILL ALSO BE COLLECTED.

1513: YOUNG AND QUILLEN ~~COLLECT~~ [initialed] 11/17/97 SW-5/Sed-5 AND SW-10/Sed-10 AT 1515. THE FOLLOWING BOTTLES ~~AND~~ PARAMETERS ARE COLLECTED:

11/17/97

11/17/97 (9)

SW-5 - VOCs (3-40ml VIALS)
App IX Metals + Ti - 1-L POLY/HNO3
Sulfide - 1-1L POLY

Sed-5 - SVOCs/PCBs - 1-8oz
App IX Metals + Ti: 1-8oz

THE SAME PARAMETERS ARE COLLECTED AT SW-10/Sed-10, WHICH IS THE DUPLICATE OF SW-5/Sed-5.

THE SAMPLE IS COLLECTED BY DIPPING THE SAMPLE CONTAINERS DIRECTLY INTO THE SURFACE WATER THAT HAS POOLED AT THE NW TOE OF THE RMA (SEE Pg. 7). THERE ARE SOME PROBLEMS w/ VOC SAMPLE VIAL COLLECTION - PROBABLY DUE TO COLD CONDITIONS.

SPLIT SAMPLES ARE COLLECTED FOR MR. EBSCH OF BEI. SPLITS AND DUPLICATE ARE COLLECTED BY ALTERNATING BOTTLES BETWEEN SW-5/SPLIT/SW-10.

11/17/97

THE SEDIMENT SAMPLE IS COLLECTED BY USING A HAND AUGER. THE SEDIMENTS ARE HIGHLY ORGANIC, WITH A LITTLE SAND. THE SEDIMENTS ARE PLACED IN A STAINLESS STEEL BOWL AND HOMOGENIZED BEFORE COLLECTION. A VOC SAMPLE IS COLLECTED FOR MR. EBSCH OF BEI WITHOUT HOMOGENIZATION.

NOTE THAT THE TEAM HAD TO BREAK THROUGH ICE THAT HAD FORMED OVER THE SW-5/SED-5 LOCATION. CARE WAS TAKEN NOT TO DISTURB LOCATION

1350: READY SAMPLE BOTTLES FOR SW-6/Sed-6 THE MS/MSD SAMPLE IS COLLECTED AT THIS LOCATION. THE FOLLOWING SAMPLES ARE COLLECTED:

SW-6 - VOCs (9 - 40 ml VIALS) w/HCl
- App IX Metals + Ti (3 - 1L POLY) w/ HNO_3
- Sulfide (3 1L POLY)

Sed-6 - SVOCs / PCBs (3 - 8oz)
- App IX Metals + Ti (2 - 8oz)

11/17/97

1630: SW-6/Sed-6 COLLECTED AT 1630. SW-6 COLLECTED BY FIRST BREAKING THROUGH THE ICE AT THE END OF THE LARGE (~18") PVC PIPE THAT REPORTEDLY HYDRAULICALLY CONNECTS THIS LOCATION TO SW-5/Sed-5. THE ICE IS PEELED BACK w/ CARE SO THE SW/Sed LOCATION IS NOT DISTURBED. MR. QUILLEN COLLECTS THE SURFACE WATER SAMPLES USING A PRE-CLEANED POLYETHYLENE BEAKER BY DIPPING THE BEAKER INTO THE WATER. MR. YOUNG HOLDS THE CONTAINERS WHILE MR. QUILLEN FILLS THEM.

THE SURFACE WATER AT SW-6 IS FAIRLY CLEAR, BUT SOMEWHAT OF A YELLOW TINGE. IT HAS SOME ORGANIC MATTER (LEAVES, STICKS, ETC.) IN IT. MR. EBSCH PLACES A THERMOMETER IN THE WATER AND READS ~34°F.

11/17/97

11/17/97 (12)

SED-6 IS COLLECTED USING A HAND AUGER. HOWEVER, SEDIMENTS ARE ONLY ABOUT 4-6" DEEP AT SED-6 BEFORE WHAT APPEARS TO BE BEDROCK IS ENCOUNTERED. SEDIMENTS ARE COLLECTED BY TAKING 4-6" OF SEDIMENT FROM SEVERAL DIFFERENT LOCATIONS.

THE SEDIMENT MATERIAL IS HIGHLY ORGANIC, AND MANY STICKS, LEAVES, ETC. MUST BE REMOVED BEFORE THE MATERIAL IS HOMOGENIZED. THE SEDIMENT IS HOMOGENIZED BEFORE FILLING THE CONTAINERS.

YOUNG AND MUBIRU ATTEMPT TO PERFORM pH, COND., TEMPERATURE READINGS ON SW-5 AND SW-6. HOWEVER, THE pH PROBE IS NOT FUNCTIONAL. IT RUNS ON A BATTERY, AND IT IS PROBABLY TOO COLD, SO THE BATTERY IS NOT OPERATIONAL.

11/17/97

11/17/97 (13)

1630: HIGGINS COLLECTS EQUIPMENT BLANK BY RUNNING DEIONIZED (DI) WATER OVER THE AUGER, SPOON AND INTO THE BOWL BEFORE COLLECTING THE DI WATER INTO THE FOLLOWING PARAMETERS.

- 3 - 1 L AMBERS - (2 FOR SVOCs, 1 FOR PCBs)
- 1 - 1 L POLY - FOR METALS

SAMPLE EB-1 COLLECTED AT 1630. IT IS COLLECTED AS AN EQUIPMENT BLANK FOR SEDIMENT SAMPLES (THUS, ONLY SVOCs, METALS AND PCBs WILL BE ANALYZED FOR. A BLANK MAY BE COLLECTED FOR SURFACE WATER IF THE PRE-CLEANED POLYETHYLENE BEAKERS ARE RE-USED.

11/17/97

11/17/97 (14)

1715: FINISH SAMPLING AT SW-6/SED6. MOVE BACK TO DECON AREA.

1730: POUR DECONTAMINATION WATER INTO A 55-GALLON DRUM NEAR THE GATE. THE DRUM IS LOCATED ~ 30' NORTH OF THE GATE, AND ABOUT 6-8' NORTH OF THE TELEPHONE POLE ADJACENT TO THE GATE.

ALL DECONTAMINATION WATER, PPE AND DRILL (GEOPROBE) CUTTINGS WILL BE PLACED AT THIS LOCATION. THE DRUMS ARE LOCKED (CLOSED) NIGHTLY, AND WILL BE PICKED UP FOR DISPOSAL AFTER SAMPLE RESULTS ARE RECEIVED FROM THE LABORATORY.

1800: LEAVE SITE FOR DAY

11/17/97

11/17/97 (15)

1900 THE AFFILIATIONS OF ALL PEOPLE INVOLVED IN THE 11/17/97 ARE:-

MS. DIANE SHARROW - U.S. EPA
MR. JIM COOK, MANISTIQUE PAPERS
MR. CLAYTON GBSCH, BITTINGER
MR. ROB YOUNG, TECHLAW
MR. TODD QUILLEN, " "
MR. KEVIN HIGGINS, " "
MR. ANTHONY MUBIRU, " "
MR. MARK ATTANASOFF, METCALF & EDDY - (TECHLAW SUBCONTRACTOR)

ALL SAMPLES WERE LABELED IN CONTAINERS, PLACED INTO COOLERS W/ ICE, AND KEPT UNDER CUSTODY OF THE SAMPLE COLLECTORS OR MANAGERS ~~BEFORE~~ DURING SAMPLING. AT THE HOTEL, TAGS ARE PLACED ON EACH BOTTLE (ALONG WITH LABELS), THE BOTTLES (WITH TAG) ARE PLACED INTO PLASTIC BAGGIES THEN INTO BUBBLE WRAP, BEFORE BEING PLACED INTO COOLERS, WITH ICE.

11/17/97

11/17/97

(16)

1900: YOUNG, HIGGINS AND MURRAY LABEL AND DISTRIBUTE SAMPLE BOTTLES INTO COOLERS FOR THE 11/18/97 SAMPLING. QUILLON AND ATTANASOFF LABEL AND TAG ALL BOTTLES FOR SUBSEQUENT SHIPMENT TO THE LAB VIA FED EX. A CHAIN OF CUSTODY RM 11/17/97 ~~SEAL~~ RM 11/17/97 # 11046 IS FILLED OUT FOR THE SAMPLES COLLECTED ON 11/17/97.

1910: THERE WAS A PROBLEM W/ THE IMMUNOASSAY SCREENING KIT. ONE OF THE REAGENTS CRYSTALLIZED APPARENTLY DUE TO THE COLD. THEREFORE, IMMUNOASSAY SCREENING COULD NOT BE CONDUCTED ON SOIL SAMPLES S-1 THROUGH S-5. MURRAY WILL CALL SDI (KIT MANUFACTURERS) FOR FURTHER INFORMATION ON TUESDAY, 11/18/97.

11/17/97

11/17/97

(17)

1920: TEAM CONTINUES TO PACKAGE SAMPLES. ADDITIONAL SAMPLES FROM 11/17/97 ARE PLACED INTO A COOLER WITH CHAIN OF CUSTODY NUMBER 11055. THESE SAMPLES, ALONG WITH SAMPLES ON COC # 11046 WILL BE SHIPPED VIA FED EX, TO THE LAB, ON 11/18/97. ROB YOUNG RETAINS CUSTODY OF THE SAMPLES IN HIS ROOM OVERNIGHT.

11/17/97

11/18/97

0840: TECHLAW TEAM ARRIVES ON-SITE

WEATHER IS CLOUDY WITH TEMPERATURES EXPECTED TO BE ABOUT 30°F BY AFTERNOON. IT IS CURRENTLY ABOUT 25°F, AND SNOW FLURRIES ARE EXPECTED.

MATRIX TECHNOLOGIES WILL PERFORM GEOPROBE WASTE SAMPLING IN RMA. GEOPROBE CREW CONSISTS OF:

TERRY MYER - LEAD DRILLER
- DRILLER HELPER

GEOPROBE SAMPLES WILL BE USED TO COLLECT WASTE SAMPLES FROM THE RMA.

11/18/97

11/18/97

0915: QUILLEN WILL LEAD CREW IN GEOPROBE SAMPLING, ASSISTED BY MUBIRU.

YOUNG WILL LEAD THE CREW IN SURFACE WATER/SEDIMENT SAMPLING, ASSISTED BY AFANASOFF.

HIGGINS WILL PERFORM SAMPLE MANAGEMENT, INCLUDING PACKAGING SAMPLES COLLECTED ON 11/17/97 FOR SHIPPING, AND TAGGING/PACKING SAMPLES COLLECTED TODAY (11/18). HIGGINS WILL ALSO PERFORM pH, CONDUCTIVITY AND TEMPERATURE READINGS ON THE SURFACE WATER SAMPLES.

1000: QUILLEN AND THE GEOPROBE CREW MOVES TO THE RMA TO PERFORM SAMPLING OF THE WASTE MATERIAL. SEE TO DO QUILLEN'S LOGBOOK FOR SPECIFIC DETAILS ON THE RMA SAMPLING.

11/18/97

11/18/97

1015: YOUNG AND ATTANASOFF ASSIST HELPING IN ORGANIZING SAMPLE CONTAINERS, EQUIPMENT. ALSO, TWO MDNR REPRESENTATIVES ARRIVE TO OBSERVE GEOPROBE/ RMA SAMPLING. THE MDNR REPRESENTATIVES ARE:

-

-

1030: YOUNG AND ATTANASOFF FINISH DECONTAMINATION OF SURFACE WATER AND SEDIMENT SAMPLING EQUIPMENT. ALL EQUIPMENT HAS BEEN DECONTAMINATED THROUGHOUT THE INVESTIGATION AS DESCRIBED ON PAGE 3 OF THIS LOGBOOK.

11/18/97

11/18/97

1040: YOUNG AND ATTANASOFF COLLECT SW4/SED 4 FROM NORTHWEST TOE OF RMA (SEE FIGURE ON PAGE 7).

THE FOLLOWING CONTAINERS ARE COLLECTED:

SW-4 – 3 40 ml VIALS = VOCs
– 1 - 1L (HNO_3) POLY = METALS + Ti
– 1 - 1L POLY – SULFIDES
SED 4 – 1 8oz – SVOCs/PCBs
1 8oz – METALS + Ti

SW-4 COLLECTED BY DIPPING THE CONTAINERS DIRECTLY INTO THE SURFACE WATER POOLED AT THE BASE OF THE RMA.

THERE IS FLOATING ORGANIC MATERIAL THAT IS CAUSING AIR BUBBLES IN THE VOC SAMPLE VIALS.

11/18/97

11/18/97 (22)

Photo #	Date	Time	Dir	Descrip
RY-1	11/18/97	1040	E	Sample Loc. SW-4/Sed. 4. Note RMA Waste Material in background

SW-4/Sed 4 are collected from ~~an~~ area where a small amount of runoff has accumulated at the base of the RMA (see photo above). Attanasoff has to break through, then gently peel back the ice to get to the sampling location.

The surface water is yellowish and clouded due to organics (sticks, leaves, etc.). The sediment ~~from~~ 11/18/97 is collected from ~0-6" with ~0-4" being organic-type material (leaves, sticks, decomposed material) and ~4-6" fine brown sand. This material is thoroughly composited before filling the containers. 11/18/97

11/18/97 (23)

1115: Ebsch gives Telhan an extra bottle for pH, conductivity and temp. Young gives this bottle to Higgins (sample coordinator) to perform pH, temp + conductivity (at SW-4 location).

1130: Young and Attanasoff move to SW-7/Sed-8 location. Sample SW-7/Sed samples collected at 1200. The following containers are collected.

SW-7 - 3-40ml vials - VOCs
- 1-1L poly (HNO_3) - Metals + T.
- 1-1L poly - Sulfide

Sed-7 - 1-8oz - SVOCs/PCBs
- 1-8oz - Metals + T.

11/18/97

11/18/97

PHOTO #	DATE	TIME	DIR	DESCRIPTION
RY-2	11/18/97	1215	SE	CLOSE-UP VIEW OF SW-7/Sed-7 SAMPLE
RY-3	11/18/97	1216	SW	OVERVIEW OF LOCATIONS SW-7/Sed-7. SEE RMA IN BACKGROUND, BEYOND VEGETATION

SW-7/Sed-7 COLLECTED NEAR THE ABANDONED RAILROAD GRADE/ACCESS ROAD, ON THE SOUTH/WEST SIDE OF THE ROAD, THERE IS GRAVEL ON TOP OF THE DIRT ROAD IN THIS AREA, SIGNIFYING THAT IT IS A LOW AREA TO THE NORTHEAST OF THE RMA.

THE SW SAMPLE IS COLLECTED BY BREAKING THROUGH ICE ON TOP OF PONDED WATER, ADJACENT TO THE ACCESS ROAD. A BEAKER IS USED TO FILL THE CONTAINERS. THE WATER IS CLEAR/YELLOWISH WITH SOME FLOATING ORGANIC (STICKS/LEAVES, ETC.) MATTER

11/18/97

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THE SEDIMENT (Sed-7) IS COLLECTED IN THE SAME GENERAL AREA AS SW-7. IT IS COLLECTED FROM 0-12" BELOW THE SURFACE. THE FIRST ~8" IS MOSTLY ORGANIC MATERIAL, WITH THE 8-12" INTERVAL A FINE SAND. ALL THIS MATERIAL IS COMPOSITED TOGETHER AND CONTAINERS ARE FILLED.

SW-8/Sed-8 WILL BE COLLECTED ACROSS THE ROAD FROM SW-7/Sed-7

1220: YOUNG AND ATTANASOFF FINISHED AT SW-7/Sed-7.

1230: QUILLWAND ATTANASOFF LEAVE SITE TO GET LUNCH

1245: HIGGINS SUPPLIES YOUNG W/ FOLLOWING INFORMATION ON SW-4 AND SW-7 -- pH, CONDUCTIVITY AND TEMPERATURE: (NEXT PAGE)

11/18/97

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SW-4 - pH = 6.65
COND. = 3,950 uS/cm
TEMP. = 40.9°F

SW-7: - pH = 7.17
COND - 1,660 uS/cm
TEMP - 39.9°F

1300: TEAMS EAT LUNCH

1345: YOUNG AND ATANASOFF LEAVE TO SAMPLE SW-8/Sed-8

1415: YOUNG AND ATANASOFF COLLECT SW-8/Sed-8. THE SAMPLE IS LOCATED ~ 75' NORTH/EAST OF THE ACCESS ROAD -- NORTH/EAST OF SW-7/Sed-7. THE FOLLOWING CONTAINERS ARE COLLECTED:

SW-8 - 30 ml VIALS - VOLS
- 1 1L POLY (HNO$_3$) - METALS
+ 1 1L POLY - SULFIDES
Sed-8 - 1 8oz - SVOLS/PCBs
1 8oz - METALS + Ti

11/18/97 [signature]

11/18/97

PHOTO #	DIR	DATE	TIME	DESCRIPTION
R4-4	SW	11/18/97	1410	OVERVIEW OF SW-8/Sed-8 LOCATION. - NOTE THE RED COLOR, UNDER THE ICE. NOTE RMA IN FAR BACKGROUND

SW-8/Sed-8 IS COLLECTED FROM A WETLAND AREA WITH SOME LOW-LYING STANDING WATER. THIS WETLAND AREA APPEARS CONTINUOUS, BETWEEN THE RR GRADE (ACCESS ROAD) AND GOULD'S SLOUGH TO THE NE.

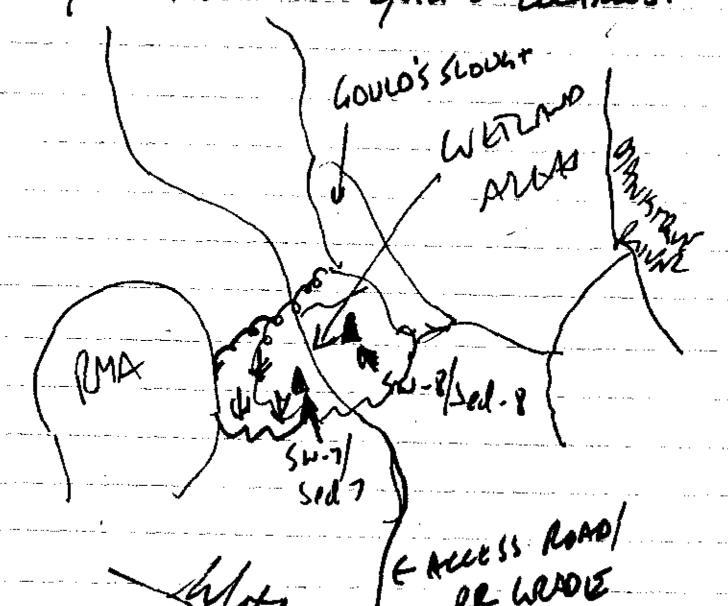
THE WATER IN THIS AREA HAS A REDDISH COLOR, INDICATIVE OF IRON. THE SEDIMENTS WERE COLLECTED BY THE USE OF A HAND AUGER, AND CONSISTED OF ABOUT ~0-4" OF ORGANIC MATERIAL AND ~4-6" WAS FINE BROWN SAND. THIS MATERIAL WAS ALL COMPOSITED BEFORE SEDIMENT SAMPLE COLLECTION.

11/18/97 [signature]

11/18/97 (28)

SW-8 IS COLLECTED USING A PRE-CLEANED 1 LITER POLY (UNPRESERVED) BOTTLE, WHICH IS USED TO TRANSFER THE SURFACE WATER INTO THE SAMPLE CONTAINERS. AS AT SW-4 AND SW-7, ADDITIONAL 8 OZ JAR IS COLLECTED FOR pH, CONDUCTIVITY AND TEMP. MEASUREMENTS.

BELOW IS A SKETCH OF THE SW-7/SED-7 AND SW-8/SED-8 LOCATIONS:



11/18/97

11/18/97 (29)

THE ENTIRE AREA TO THE WEST-NORTHWEST OF THE RMA CONTAINS SMALL AREAS OF STANDING WATER, AND IS ALL LOW-LYING, INDICATIVE OF WETLANDS.

SW-7/SED-7 IS COLLECTED AT A LOW POINT ADJACENT TO THE ACCESS ROAD. THE TEAM WALKED THE AREAS NEAR SW-7/SED-7 AND SW-8/SED-8 AND DID NOT SEE ANY CHANNELIZED FLOW BETWEEN THE RMA AND GOULD'S SLOUGH; ONLY THESE LOW-LYING AREAS COVERED, IN PARTS BY SURFACE WATER (WHICH IS CURRENTLY ICED OVER).

BOTH SW-7/SED-7 WERE RE-LOCATED FROM THEIR PROPOSED LOCATIONS IN THE SAMPLING AND ANALYSIS PLAN (SAP) DUE TO THE LACK OF OBSERVED CHANNELIZED SURFACE FLOW.

11/18/97

1530: HIGGINS PERFORMS READING OF SW-8:

pH = 7.16
COND: = 1,960 us/cm
TEMP 43.0°F

RECORDED USING HYDAC CONDUCTIVITY/TEMPERATURE/pH METER. THE SERIAL NUMBER ON THE METER IS 9603. IT WAS RENTED FROM HAZCO SERVICES.

KEVIN HIGGINS PERFORMS THE CALIBRATION OF THE METER. SEE HIGGINS' LOGBOOK FOR INFORMATION CONCERNING THE CALIBRATION.

HIGGINS IS RUNNING pH AT THE DECONTAMINATION AREA, SINCE HE CAN KEEP THE UNIT WARM IN A CAR -- IT IS AFFECTED BY COLD WEATHER AT THE SAMPLING LOCATIONS

1/18/97

1540: YOUNG AND HIGGINS MOVE TO SW-3/Sed-3 LOCATION. SW-3/Sed-3 ARE COLLECTED AT 1600, FROM A RUNNING STREAM LEADING INTO THE MANISTIQUE RIVER. THE CONTAINERS (SW) ARE COLLECTED BY FILLING THE CONTAINERS DIRECTLY IN THE SURFACE WATER. THE LOCATION IS ~ 75-100' UPSTREAM OF THE RIVER.

THE SEDIMENT IS COLLECTED BY USING A STAINLESS STEEL SPOON AND PLACING IT DIRECTLY INTO THE SAMPLE CONTAINERS. THE SEDIMENT IS COLLECTED FROM THE DEPOSITIONAL PORTION OF THE STREAM.

YOUNG APPROACHES THE LOCATION FROM THE DOWNSTREAM PORTION OF THE STREAM TO AVOID DISTURBANCE OF THE SAMPLE.

1/18/97

THE FOLLOWING CONTAINERS ARE COLLECTED

SW-3 – 3 – 40ml VIALS
– 1 1L POLY (HNO_3) - METALS/TI
– 1 1L POLY - SULFIDE

Sed.3 – 1 8oz - SVOCs/PEBS
– 1 8oz - METALS

THE SURFACE WATER IS CLEAR, WITH VERY LITTLE ORGANIC MATTER, UNLIKE OTHER LOCATIONS. THE WATER AT SW-3 IS CHANNELIZED AND FLOWING. AN EXTRA 8oz BOTTLE IS COLLECTED FOR pH, COND. AND TEMP.

THE SEDIMENT (Sed-3) IS COLLECTED FROM THE SURFACE OF A DEPOSITIONAL AREA (0-2"). THE SEDIMENT IS NOT COVERED BY SW AT THE SAMPLING LOCATION. THE SEDIMENT IS A FINE BROWN SAND MIXED WITH A DARK-FINE GRAINED ORGANIC MATERIAL. AND THIS IS COMPOSITED TO COLLECT THE SAMPLE.

11/18/97

PHOTO #	DATE	TIME	DIR	DESCRIPTION
R4-5	11/18/97	1620	S	OVERVIEW OF SAMPLE LOCATION SW-3/Sed-3 NOTE WATER IS CLEAR AND FLOWING.

1630: IT IS DECIDED THAT YOUNG AND HIGGINS WILL FOLLOW THE CHANNELIZED STREAM, UPSTREAM TO GOULD'S SLOUGH. THIS WILL HELP TO DETERMINE THE LOCATION OF COLLECTION FOR THE SW-2/Sed.2 LOCATION.

~~1630: YOUNG AND HIGGINS MOVE TO SW-2/Sed.2 LOCATION. THE SAMPLES ARE COLLECTED AT 1645. THE FOLLOWING CONTAINERS ARE COLLECTED:~~
~~–~~
~~–~~
~~–~~
~~–~~
~~–~~

R4- 11/18/97
SAMPLE NOT COLLECTED

11/18/97

(34)

~~THE SAMPLE IS COLLECTED FROM~~ RY 11/18/97

1640: HIGGINS AND YOUNG PERFORM RECONNAISSANCE OF SW RUNOFF LEADING FROM THE WETLAND AREA (GOULD'S SLOUGH) TO THE MANISTIQUE RIVER. THE RECONNAISSANCE IS PERFORMED TO DETERMINE THE SAMPLING LOCATION FOR SW-2/SED-2.

~~THE SURFACE WATER IS~~ RY 11/18/97

AS SHOWN ON THE SKETCH ON PAGE 35, THE STREAM WHERE SW-3/SED-3 WAS COLLECTED APPEARS TO RECEIVE FLOW FROM A WOODED AREA UPGRADIENT AND EAST OF GOULD'S SLOUGH AND THE RMA, HOWEVER, THE CREEK/STREAM ALSO APPEARS TO RECEIVE SOME SURFACE WATER CHANNELIZED FLOW FROM GOULD'S SLOUGH. STANDING WATER IN A LARGE AREA AS SHOWN IN FIGURE 2 OF THE SAMPLING PLAN, IS AT PRESENT ADJACENT TO THE MANISTIQUE RIVER. [signature] 11/18/97

11/18/97 (35)

~~THE SEDIMENT IS~~ RY 11/18/97

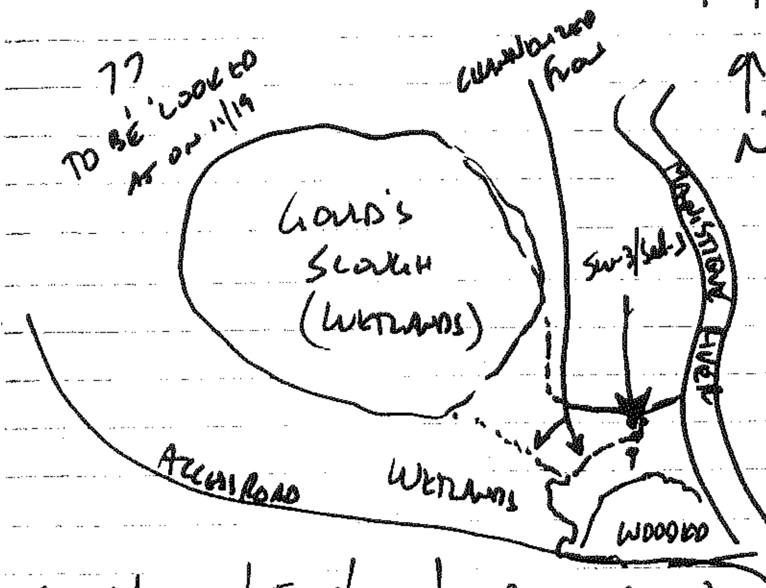


PHOTO #	DATE	TIME	DIR	DESCRIPTION
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RY 11/18/97

[signature] 11/18/97

11/18/97

SINCE THE SURFACE WATER FLOW FROM GOULD'S SLOUGH TO THE MANISTIQUE RIVER IS DIFFERENT THAN THAT SHOWN IN THE FILES (i.e., THE LARGE OPEN BODY OF WATER ADJACENT TO THE RIVER IS NOT THERE), YOUNG DECIDES NOT TO TAKE SW-2/Sed-2. LOCATION SW-2/Sed-2 WILL BE ACCESSED FROM THE ACCESS ROAD TOMORROW IN AN ATTEMPT TO FIND OPEN WATER AT GOULD'S SLOUGH

1720: YOUNG AND HIGGINS FINALIZE RECONNAISSANCE. RETURN TO DECONTAMINATION AREA.

1740: SAMPLING TEAM PACKS SAMPLING MATERIALS INTO TRUCKS. ALL SAMPLE IDW IS PLACED IN 55-GALLON DRUMS NEAR THE ENTRY GATE.

11/18/97

11/18/97

1755: SAMPLING TEAM LEAVES THE SITE.

1815: HIGGINS PERFORMS pH, COND. & TEMP MEASUREMENTS ON SW-3 AT THE HOTEL. THE FOLLOWING READINGS ARE REGISTERED FOR SW-3.

pH = 10.25
COND. = 790 µm/cm
TEMP = 40.7°F

1830: QUILLON TAGS WASTE SAMPLES COLLECTED AT THE AREA. YOUNG READIES CONTAINERS FOR GROUNDWATER SAMPLING. HIGGINS TAGS SURFACE WATER/SEDIMENT SAMPLES COLLECTED ON 11/18/97. MUBIRU PERFORMS IMMUNO ASSAY ANALYSES FOR PCBs

11/18/97

11/18/97 (38)

~~0 : SAMPLING TEAM ARRIVES ON-SITE~~ RH 11/18/97

1900: EARLIER IN THE DAY, KEVIN HIGGINS, THE SAMPLE COORDINATOR, PACKAGED SAMPLES AND SHIPPED THEM IN COOLERS VIA FED EX TO INTERTEK TESTING SERVICES IN RICHARDSON, TX. THE SAMPLES WERE SENT W/ THE FOLLOWING CHAIN OF CUSTODY NUMBERS, UNDER THE FOLLOWING AIRBILL NUMBERS:

1. COC# 11046 — AIRBILL 537619 5952
2. COC# 11056 — AIRBILL 537619 6070
3. COC# 11055 — AIRBILL 537619 6081

YOUNG WAS PRESENT WHEN HIGGINS APPLIED CUSTODY SEALS TO THE COOLERS, TAPED THEM, AFTER PLACING COCS INTO COOLERS. THE SAMPLES WERE TAKEN ~~[illegible]~~ TO THE HOTEL BY MARK ATTANACOFF OF M&E BEFORE HE LEFT FOR HOME.

11/18/97

11/19/97 (39)

RH 11/19/97 NOTE: ALL SAMPLES COLLECTED ON 11/18/97 WERE EITHER SHIPPED TO THE LAB VIA FED EX (COC#S – 11055 AND 11056), OR WERE HELD OVERNIGHT (COC#S 11058 AND 11057) FOR SHIPMENT ON 11/19/97

0850 SAMPLING TEAM ARRIVES ON-SITE. THE MARTY DRILL TEAM HAS ALREADY ARRIVED. QUILLEN AND MUBIRU STOPPED TO PICK UP SUPPLIES AND WILL BE ON-SITE LATER. BEI REPS. ARE ALSO ON-SITE.

0910: QUILLEN AND MUBIRU ARRIVE ON-SITE. THEY WILL OVERSEE AND CONDUCT GEOPROBE WASTE SAMPLING. YOUNG AND HIGGINS WILL CONDUCT SURFACE WATER/SEDIMENT SAMPLING.

0930: YOUNG AND HIGGINS LEAVE TO COLLECT SW-2/SED-2. QUILLEN AND MUBIRU WILL OVERSEE GEOPROBE. YOUNG AND HIGGINS DRIVE TO LOCATION OF W-6 TO ACCESS THE GOULD'S SLOUGH SURFACE WATER.

11/19/97

11/19/97 (40)

1000: YOUNG AND HIGGINS COLLECT SW-2/Sed-2. THE FOLLOWING SAMPLE CONTAINERS ARE COLLECTED

SW-2 - 3 40ml VIALS - VOCs
- 1 1L POLY (HNO_3) - metals + Ti
- 1 1L POLY - SULFIDE

Sed-2 - 1 8oz - SVOCs/PCBs
- 1 8oz - Metals + Ti

(SW-2) - 1 8oz - pH/cond/temp

THE SAMPLE WAS COLLECTED FROM THE SOUTHWESTERN PORTION OF GOULD'S SLOUGH. THE SAMPLES ARE COLLECTED FROM A SURFACE WATER AREA WITH REED-LIKE VEGETATION. IT IS COLLECTED FROM STANDING WATER (COVERED w/ ICE), BY DIPPING THE BOTTLES DIRECTLY INTO THE WATER. Sed-2 IS COLLECTED USING A HAND AUGER FROM DEPTHS OF ~ 0-8". THE WATER IS CLEAR w/ SOME ORGANICS, THE SEDIMENT IS MOSTLY BLACK ORGANIC-LOOKING MATERIAL (LOOKS LIKE PEAT), WITH SOME LEAVES, STICKS, ETC., AND SOME SILT/SAND.

11/19/97 (41)

PHOTO#	DIR	DATE	TIME	DESCRIPTION
R4-6	NE	11/19/97	1020	OVERVIEW OF SW-2/Sed-2 LOCATION -- GOULD'S SLOUGH IN BACKGROUND (PANORAMIC)
+ R4-7	E			
+ R4-8	SE			

GOULD'S SLOUGH IS A LARGE BODY OF WATER SURROUNDED BY GRASSY VEGETATION WHICH IS ALSO PARTIALLY COVERED WITH WATER. IT IS AT LEAST ~~1/4 to~~ 1/2 MILE LONG BY ABOUT 1/4 MILE WIDE, AND IS COVERED BY ICE. THE DEPTH OF THE WATER CANNOT BE CONFIRMED. HOWEVER, IN THE GRASSY AREA @ SW-2, IT IS ABOUT 8" DEEP. A SKETCH OF GOULD'S SLOUGH AND SW-2/Sed-2 LOCATION IS SHOWN ON THE NEXT PAGE.

11/19/97

11/19/97

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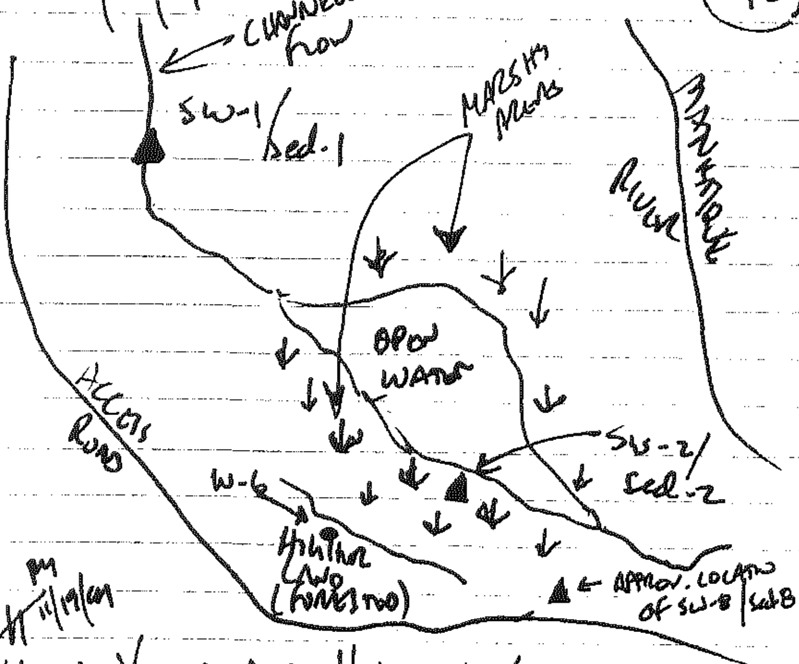

PM 11/19/97

1110: YOUNG AND HIGGINS COLLECT SW-1/Sed-1 FROM A LOCATION UPSTREAM OF GOULD'S SLOUGH. THE FOLLOWING SAMPLE CONTAINERS ARE COLLECTED:

SW-1	– 3 40 ml VIALS	– VOCs
	– 1 1L POLY (HNO_3)	– METALS + Ti
	– 1 1L POLY	– SULFIDE
Sed-1	– 1 - 8oz	– SVOCs/PCBs
	– 1 - 8oz	– Metals + Ti
(SW-1)	1 - 8oz	– pH/COND/TEMP

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PHOTO	ROLL	DATE	TIME	DESCRIPTION
59-9	5	11/19/97	1120	OVERVIEW OF BACKGROUND SEDIMENT/SURFACE WATER SAMPLE SW-1/Sed-1 (LOOKING DOWNSTREAM)

THE SURFACE WATER IS ~ 2' IN THIS AREA, AND SEDIMENTS WERE COLLECTED FROM ~ 0-6".

THE SW SAMPLE WAS COLLECTED BY DIPPING THE SAMPLE CONTAINERS DIRECTLY INTO THE WATER. SEDIMENTS ARE COLLECTED FROM 0-6" USING A HAND AUGER.

YOUNG HAD TO BREAK THROUGH THE ICE TO COLLECT THE SAMPLE. THE SURFACE WATER IS CLEAR, WITH A YELLOW TINGE. AN EXTRA 8 OZ JAR IS COLLECTED FOR pH, COND AND TEMP READINGS

11/19/97

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SED-9 IS HIGHLY ORGANIC, APPARENTLY DECOMPOSED ORGANIC MATERIAL MIXED IN w/ A SILTY MATRIX. IT IS DARK BROWN.

THE STREAM, UPSTREAM OF LIONARDI SLOUGH IS ABOUT 40-50' WIDE, AND APPEARS TO BE > 4' DEEP. IT IS ICED OVER, SO IT DOES NOT APPEAR THAT THERE IS SIGNIFICANT FLOW.

SW-1/SED-1 WAS COLLECTED LAST, AS SAMPLE COLLECTION FOR SURFACE WATER/SEDIMENT WAS FROM MOST DOWNSTREAM (SW-3/SED-3) TO MOST UPSTREAM (SW-1/SED-1), WITH SW-2/SED-2 BETWEEN (SEE PAGE 7 OF THIS LOGBOOK FOR A SKETCH OF SAMPLE LOCATIONS.

11/9/97

11/19/97

1140: YOUNG AND HIGGINS MOVE BACK TO DELON AREA.

1145: YOUNG STOPS TO PHOTOGRAPH EAST SIDE OF RMA.

PHOTO #	DIR	DATE	TIME	DESCRIP
RY-10 RY-11	W	11/19/97	1145	PANORAMIC VIEW OF EASTERN 1/2 OF RMA, WHERE ACTIVE DUMPING IS OCCURRING.

1200: YOUNG AND HIGGINS RETURN TO DELON AREA. HIGGINS PERFORMS pH/COND. READINGS, AS FOLLOWS:

SW-1 : pH = 7.9
COND. = 810 µs/cm
TEMP. = 44.0°F

SW-2 : pH = 7.5
COND. = 1,670 µs/cm
TEMP. = 45.8°F

11/19/97

1300: Young and Mubirm check water levels in wells / depths of wells. Start w/ most upgradient wells, and work downgradient. After sounding, the probe is rinsed w/ deionized water.

1305: Well W-2

Depth of well = 12.0
Depth to water = 2.11
~ Height to TOC (inner) = ~2'
~ " " (outer) = ~2'

- No reading on PID
- PVC well w/ no locking cap.

A water sounding instrument is used to measure water levels in each well. It is decontaminated using deionized water between wells.

1/19/97

1320: Well W-4

Depth of well = 15.0'
Depth to water = 4.37
~ Height to TOC (inner) = ~3.5'
~ " " (outer) = 3.5.

- No readings on PI
PVC well w/ no locking cap.

1335: Well W-8
Depth of well = 9.0'
• Depth to water = 3.61'
~ Height to TOC (inner) ~ 3.0'
~ Height to TOC (outer) ~ 3.0'

- Readings of ~0.2 PPM on PID
- PVC well w/ no locking cap

There are new monitoring wells adjacent to the W-4 and W-8 wells. Therefore, the redprobe will be used to aquire water at several locations.

11/19/97

11/19/97

1420: TEAM MOVES TO INSTALL GW-1 APPROX. 50' EAST OF W-4. THE WELL IS INSTALLED USING GEOPROBE TECHNIQUES. TODD QUILLON OVERSEES THE INSTALLATION OF THE WELL.

GW-1 IS INSTALLED WITH A SCREEN BETWEEN 5-10' BGS. IT IS PVC, 1" SLOTTED SCREEN. THE 5-10' SCREEN DEPTH IS SELECTED BASED ON THE MEASURED DEPTH TO WATER AT W-4 (pg. 47 - ABOUT 1' BELOW GS), AND THE FACT THAT THE GW-1 LOCATION IS ABOUT 3-4' HIGHER THAN W-4.

SAMPLES ARE COLLECTED FROM THE WELL USING A PRE-CLEANED 1" BAILERS SUPPLIED BY THE DRILLERS (MATRIX). IT IS RINSED w/ DEIONIZED WATER BEFORE USE, AS A PRECAUTIONARY DECONTAMINATION STEP.

11/19/97

11/19/97

INITIALLY, MATRIX PURGES 2L FROM THE WELL. YOUNG TAKES pH, COND, TEMP, AS FOLLOWS:

pH = 8.35
COND = 1,080
TEMP = 42.0°F

AFTER ~ 3.5L BAILED, THE READINGS ARE:

pH = 7.25
COND = 900
TEMP = 42.2 °F

AFTER 5L BAILED, THE READINGS ARE:

pH = 7.05
COND = 930
TEMP = 42.3°F

11/19/97

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(50)

QUILLEN WILL SAMPLE GW-1, AND WILL BE ASSISTED BY MUBIRU WHEN HE RETURNS.

GW-1 IS SAMPLED FIRST SINCE IT IS REPORTEDLY UPGRADIENT OF THE RMA. IT IS SAMPLED RATHER THAN W-4, SINCE BITTNER HAD, ONE WEEK BEFORE, INSTALLED A NEW WELL ADJACENT TO W-4. YOUNG IS CONCERNED THAT THE WATER QUALITY AT W-4 MAY BE AFFECTED BY THE NEW WELL INSTALLATION. ALSO, EBSCH INDICATED THAT THE NEW WELL HAD NOT BEEN DEVELOPED YET.

1530: YOUNG MOVES w/ MATRIX CREW TO THE SECOND GEOPROBE LOCATION. THE GEOPROBE CANNOT ACCESS THE LOCATION THAT NEEDS TO BE SAMPLED w/ THEIR RIG -- IT IS A WETLAND AREA THAT IS INACCESSIBLE.

11/19/97

11/19/97

(51)

1545: YOUNG AND MATRIX TEAM POUND 20DI MANUALLY AT THE BASE OF THE LANDFILL. THE SCREEN IS SET 5' BELOW GROUND SURFACE, AND SCREENED FROM 0-5'. THE LOCATION OF THE WELL POINT IS SHOWN ON PAGE 7.

WELL IS DESIGNATED GW-2.

PHOTO	DIR	DATE	TIME	DESCRIPTION
RY-12	S	11/19/97	1600	OVERVIEW OF GW-2 - NOTE RMA IN BACKGROUND.

THE WELL IS CONSTRUCTED OF 1" PVC, WITH 5' SCREEN (0-5' BGS), AND ABOUT 2.5' OF RISER FOR ACCESS. IT IS LOCATED IN A SWAMPY AREA, JUST NE OF THE RMA, IN A TOPOGRAPHICALLY HIGHER AREA, SO THAT STANDING WATER WILL NOT AFFECT THE WELL AND SUBSURFACE WATER SAMPLES.

11/19/97

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THE GW-2 LOCATION IS ~ 200' EAST OF THE SW-6/GQ-6 LOCATION. YOUNG ASSUMES THIS LOCATION IS DIRECTLY DOWNGRADIENT OF THE RMA. BEDROCK WAS ENCOUNTERED AT 5' BGS AT GW-2, SO THE WELL HAD TO BE SCREENED FROM 0-5' BGS, WITH 2' OF RISER FOR ACCESS

1620: YOUNG BEGINS PURGING GW-2. THE WATER IS ~1/2' BELOW THE SURFACE. THE INITIAL BAILER IS COLLECTED FOR pH, COND + TEMP., AS FOLLOWS

pH - 10.10
COND - 3,910
TEMP - 35.8

THE WATER IS A DARK BROWN - VERY CLOUDY, W/ SOME ORGANIC SMELL - BUT NO READINGS ON PID.

11/19/97

11/19/97

AFTER ~1 GALLON IS BAILED THE FOLLOWING PARAMETERS ARE READ:

pH - 10.1
COND: 3,740
TEMP: 36.9

3,740

THE WELL IS NOT PRODUCING AT A GREAT ENOUGH RATE TO SUSTAIN PURGING, SO YOUNG STOPS PURGING AT ~1 GALLON.

THE WATER IN THE WELL IS DARK BROWN, WITH WHAT APPEARS TO BE AN ORGANIC COLOR.

THE WELL IS SAMPLED USING A 1" DISPOSABLE BAILER (PREVIOUSLY RINSED WITH DI WATER)

11/19/97

11/19/97

1630: YOUNG COLLECTS GW-2 FROM THE WELL POINT AT THE BASE (NORTH-EASTERN) OF THE RMA. THE FOLLOWING CONTAINERS ARE COLLECTED: ~~3~~ 11/19/97
- 3 40ml VIALS (VOCs)
- 2 1L AMBERS (SVOCs)
- 1 1L AMBER (PCBs)
- 1 1L POLY (HNO_3) (METALS + TI)
- 1 1L POLY (SULFIDE + NITRATE/NITRITE)
- 1 8oz (pH/COND/TEMP)

THE BOTTLES ARE FILLED USING A BOTTOM ATTACHMENT AND/OR POURED OFF THE TOP OF THE BAILER. SPLIT SAMPLES ARE COLLECTED (AS AT ALL OTHER LOCATIONS) BY MP REPRESENTATIVE IBSCH.

THE WATER DOES NOT SEEM TO CLARIFY TO ANY GREAT EXTENT DURING THE BAILING OF GW-2.

11/19/97

11/19/97

1845: YOUNG AND MUBIRU FINALIZE BAILING/SAMPLE COLLECTION AT GW-2. THE 1" PVC PIPE IS REMOVED BY HAND AND PLACED INTO PLASTIC FOR SUBSEQUENT DISPOSAL. THE 1" HOLE IS FILLED WITH BENTONITE CHIPS TO THE SURFACE.

1800: QUILLON INFORMS YOUNG THAT EB-2 WAS COLLECTED IN ASSOCIATION WITH THE WASTE SAMPLING. THE SAMPLE WAS COLLECTED AT 1645, BY POURING DEIONIZED WATER THROUGH THE GEOPROBE MACROCORE w/ A LINER INSERTED. THIS IS THE CONFIGURATION USED TO COLLECT THE WASTE SAMPLES USING THE GEOPROBE. THE FOLLOWING BOTTLES WERE COLLECTED:
- 3 40ml VIALS (VOCs)
- 2 1L AMBERS (SVOCs)
- 1 1L AMBER (PCBs)
- 1 1L POLY (HNO_3) (METALS + TI)
- 1 1L POLY (SULFIDE)

11/19/97

1815: THE SAMPLING TEAM GATHERS UP SAMPLING EQUIPMENT. ALL IDW IS TRANSFERRED TO THE IDW DRUMS NEAR THE FRONT GATE. THE DRUMS ARE CLOSED BEFORE EXITING.

1820: THE SAMPLING TEAM LEAVES THE SITE.

1845: THE FOLLOWING DEVIATIONS HAVE BEEN MADE (FROM THE SAMPLING PLAN):

SURFACE WATER/SEDIMENTS: THE SAMPLING TEAM COULD NOT FIND SPECIFIC CHANNELIZED FLOW BETWEEN THE RMA AND GOULD'S SLOUGH. THE ENTIRE AREA IS A WETLAND-TYPE AREA. THEREFORE 3 SAMPLES (SW-5/Sed-5, SW-6/Sed-6, AND SW-4/Sed-4) WERE COLLECTED FROM POOLED AREAS ADJACENT TO THE RMA. SW-7/Sed-7 WERE COLLECTED FROM AN APPARENT LOW AREA NEAR THE ACCESS ROAD BETWEEN THE RMA AND SLOUGH.

11/19/97

NO CULVERTS WERE LOCATED UNDER THE ACCESS ROAD. ONLY THREE SAMPLES WERE COLLECTED FROM THE GOULD SLOUGH WATER COURSE (SW-3/Sed-3, SW-2/Sed-2) AND SW-1/Sed-1), SINCE THREE SAMPLES WERE COLLECTED ADJACENT TO THE RMA, WHERE HAZ. CONSTITUENTS WOULD BE EXPECTED TO EXIST AT GREATER CONCENTRATIONS.

SOIL SAMPLES: NO SOIL SAMPLES WERE COLLECTED FROM BENEATH THE WASTE PILE. REPRESENTATIVE WASTE SAMPLES WERE COLLECTED AT GEOPROBE BORING LOCATIONS, SO NO SOILS WERE NEEDED. SOIL SAMPLES SS-1 AND SS-2 WILL BE COLLECTED ON 11/20/97.

GROUNDWATER SAMPLES: WELL SAMPLES W-4, W-5, W-6 AND W-8 WERE PROPOSED IN THE SAP. HOWEVER, ACCORDING TO EBSCH, W-5 NO LONGER EXISTS, AND COULD NOT BE FOUND BY THE SAMPLING TEAM. GW-2 WAS INSTALLED AS A WELL POINT TO COLLECT A GROUNDWATER SAMPLE DIRECTLY DOWNGRADIENT OF THE RMA.

11/19/97 (58)

BIRTANYR ENGINEERING HAD, ONE WEEK BEFORE, INSTALLED NEW WELLS ADJACENT TO W-4 AND W-8. YOUNG DID NOT FEEL THAT REPRESENTATIVE GROUNDWATER SAMPLES WOULD BE PRESENT AT THESE WELLS. THUS, W-7 WAS SUBSTITUTED FOR W-8, AND GW-1 WAS INSTALLED, USING THE GEOPROBE, NEAR THE LOCATION OF W-4. EBSCO WAS INDICATED THAT W-6 DOES NOT PRODUCE MUCH WATER. THE TEAM WILL ATTEMPT TO SAMPLE W-6 ON 11/20/97.

MOBIRM CONDUCTED IMMUNOASSAY SCREENING ON SOIL SAMPLES (S-1 THROUGH S-5) AND SLUDGE (SLG-2 AND SLG-3) SAMPLES ON 11/19/97. THE FOLLOWING RESULTS WERE ENCOUNTERED:

SAMPLE #	PCB CONCENTRATION
S-1	1-4 PPM
S-2	1-4 PPM
S-3	1-4 PPM
S-4	1-4 PPM
S-5	1-4 PPM

11/19/97

11/19/97 (59)

SAMPLE #	PCB CONCENTRATION
CONTROL *	~~SLG~~ 1 PPM
SLG-2 (16-18)	4 PPM
SLG-2 (20-22)	4-15 PPM
SLG-3 (8-10)	4 PPM
SLG-3 (18-20)	4 PPM

* - CONTROL SAMPLE COLLECTED FROM SOIL AT HOTEL.

TWO COOLERS OF SAMPLES WERE SHIPPED ~~VIA~~ FED EX TO THE LAB ON 11/19/97. ALL SAMPLES WERE PACKAGED AND SHIPPED AS DESCRIBED ON PAGES 15+16 OF THIS LOGBOOK. COC #S 11057 AND 11058 WERE PLACED INTO THE COOLERS, AND SHIPPED VIA FED EX AIRBILLS 537 6195974 AND 537 6195996, RESPECTIVELY.

1930: SAMPLING TEAM FILLS OUT TAGS FOR EACH SAMPLE COLLECTED ON 11/19/97. THE SAMPLES ARE PLACED INTO PLASTIC BAGGIES, BUBBLE WRAP, AND INTO COOLERS W/ ICE, AND ARE RETAINED IN HOTEL ROOMS OVERNIGHT TO ENSURE CUSTODY. THE SAMPLES WILL BE SHIPPED TO THE LAB ON 11/20/97.

11/19/97

11/20/97

0830: SAMPLING TEAM ARRIVES ON-SITE.

0840: YOUNG & HIGGINS COLLECT EB-3. THE SAMPLE (EQUIPMENT BLANK) IS COLLECTED BY POURING DEIONIZED WATER INTO A PRE-CLEANED SAMPLE BEAKER (USED AT LOCATION), AND POURED INTO 3 40 ml VIALS AND 2 1L POLYS, 1 w/ HNO_3 (Metals + Ti) AND ONE w/ NO PRESERVATIVE (SULFIDE).

0845: QUILLOWAD MUBIM LEAVE TO COLLECT GROUNDWATER AT W-7 AND W-6 (EXISTING WELLS). HIGGINS AND YOUNG WILL COLLECT SS-1 AND SS-2 FROM EAST AND WEST SIDES OF THE RMA.

SS-1 IS COLLECTED IN THE GENERAL AREA OF PCB IMMUNOASSAY SAMPLE S-1.

11/20/97

11/20/97

0930: SS-1 IS COLLECTED BY YOUNG & HIGGINS. THE FOLLOWING CONTAINERS ARE COLLECTED:

1 - 8oz (SVOCs/PCBs)
1 - 8oz (APP IX METALS + Ti)

: SS-1 IS COLLECTED IN THIS LOCATION SINCE IT IS DIRECTLY WEST OF THE FILL. IT IS COLLECTED ~1,000' SOUTH OF LOCATION S-1, SINCE NONE OF THE SOIL SAMPLES (S-1 THROUGH S-5) SHOWED SIGNIFICANT PCB CONCENTRATIONS (SEE PAGE 58 OF THIS LOGBOOK), AND NO SOIL, SURFACE WATER, OR SEDIMENT SAMPLES WERE COLLECTED FROM THIS AREA.

NEITHER A DUPLICATE OR MS/MSD SAMPLE WILL BE COLLECTED AT SS-1 OR SS-2, SINCE THE "SOIL" MATERIAL IS BASICALLY THE SAME AS THE SEDIMENT MATERIAL COLLECTED AT SED-1 THROUGH SED-8. THE ENTIRE AREA SURROUNDING THE RMA IS WETLAND-TYPE SOIL, AND THE SOIL SAMPLES WERE COLLECTED IN THE SAME MANNER AS MOST OF THE SEDIMENTS; USING A HAND AUGER.

11/20/97

11/20/97

PHOTO #	DIR	DATE	TIME	DESCRIPTION
RY-13	N	11/20/97	0920	OVERVIEW OF SAMPLING LOCATION SW-5/Sed-5 AT NW¼ OF RMA. PHOTOGRAPH IS TAKEN FROM THE TOP OF THE RMA
RY-14	E	11/20/97	0945	VIEW OF SURFACE SOIL SAMPLE SS-1. SS-1 WAS COLLECTED FROM SOILS AT THE BASE OF THE WESTERN SIDE OF THE RMA, FROM A SAMPLE DEPTH OF 0-6"

SAMPLE SS-1 CONSISTED OF A SILTY TO SANDY, DARK BROWN MATERIAL W/ SOME DECOMPOSED ORGANICS.

11/20/97

11/20/97

THERE IS A SMALL CHANNEL THAT SEEMS TO DIVERT RUNOFF TO A LARGE WETLAND WEST OF THE RMA. THIS WETLAND IS VERY LARGE, AND APPEARS TO BE CONNECTED TO THE WETLANDS NORTH OF THE RMA.

1000: YOUNG AND HIGGINS COLLECT SURFACE SOIL SAMPLE SS-2.

PHOTO #	DIR	DATE	TIME	DESCRIPTION
RY-15	W	11/20/97	1005	OVERVIEW OF SAMPLE LOCATION SS-2. IT IS AT THE BASE OF THE RMA, NEAR THE SE CORNER.

THE FOLLOWING CONTAINERS ARE COLLECTED FROM SS-2.

1 - 8oz (SVOCs/PCBs)
1 - 8oz (App IX Metals + T.)

11/20/97

11/20/97 (64)

THE SOIL AT SS-2 CONSISTS OF A SILTY-SANDY MATRIX (DARK GREY/BROWN) WITH ABUNDANT ORGANIC MATERIAL. THE LOCATION IS BELOW ~2" OF WATER, AND THE SAMPLE WAS COLLECTED FROM 0-6".

THE ENTIRE AREA NEAR THE SE CORNER OF THE RMA IS LOW-LYING, AND CONTAINS POOLED/STANDING WATER IN SEVERAL AREAS.

SS-2 IS COLLECTED FROM THIS LOCATION (SEE FIGURE ON Pg. 7) SINCE THE RESULTS OF THE IMMUNOASSAY SCREENING DID NOT SHOW SIGNIFICANT PCB CONCENTRATION OR VARIATION BETWEEN SCREENING LOCATIONS, AND THERE WERE SL/SED SAMPLES COLLECTED IN THE NE, NW AND NORTH PORTIONS OF THE RMA, BUT NOT ALONG THE EASTERN PERIMETER.

11/20/97

11/20/97 (65)

1020: YOUNG & HIGGINS MOVE TO LOCATION WHERE QUILLON AND MUBIRU ARE SAMPLING W-7.

PHOTO #	DIR	DATE	TIME	DESCRIPTION
R1-16	SW	11/20/97	1025	SAMPLE LOCATION W-7.

YOUNG WILL ASSIST MUBIRU W/ SAMPLING OF W-7. QUILLON AND HIGGINS WILL SAMPLE W-6. SEE T. QUILLON'S LOGBOOK FOR INFORMATION CONCERNING PURGING AND SAMPLE PARAMETERS AT W-7. QUILLON INDICATED THAT ~10 GALLONS WERE PUMPED FROM THE WELL.

1045: YOUNG & MUBIRU COLLECT W-7. THE MSD/MS + DUPLICATE ARE COLLECTED AT THIS LOCATION, THE DUPLICATE IS DESIGNATED AS W-17.

11/20/97

11/20/97

THE FOLLOWING BOTTLES ARE COLLECTED AT W-7 / W-17:

- 9 40ml VIALS - VOCs / W-7
- 6 1L AMBER - SVOCs / W-7
- 3 1L AMBER - PCBs / W-7
- 3 1L POLY (HNO_3) - Metals + Ti / W-7
- 3 1L POLY - SULFIDES / W-7

- 3 40ml VIALS - VOCs / W-17
- 2 1L AMBER - SVOCs / W-17
- 1 1L AMBER - PCBs / W-17
- 1 1L POLY (HNO_3) - Metals + Ti / W-17
- 1 1L POLY - SULFIDES / W-17

QUILLON HAS TAKEN pH/COND./TEMP READINGS DURING PURGING. SEE QUILLON'S LOGBOOK FOR SPECIFIC READINGS AND PURGE VOLUMES.

YOUNG AND MUBIRY COLLECT GROUNDWATER AT W-7 USING A 2" PRE-CLEANED BAILER. NOTE THAT THE AREA SURROUNDING W-7 IS A WETLAND TYPE AREA, WITH MUCH SURFACE WATER (STANDING, W/ ICE).

11/20/97

11/20/97

1140: SAMPLING AT W-7 COMPLETE. QUILLON IS SAMPLING @ W-6. YOUNG + HIGGINS GO BACK TO DEBRIS AREA TO COLLECT A WASTE SAMPLE OF THE NEWLY-DEPOSITED PAPER WASTE.

THE COLLECTION OF THESE SAMPLES IS NOT PROPOSED IN THE SAP, HOWEVER THE SAMPLE IS COLLECTED IN ORDER TO GET AN IDEA OF CONSTITUENTS PRESENT IN THE WASTE MATERIAL CURRENTLY BEING DISPOSED IN THE AREA. THIS SAMPLE WILL ALSO ALLOW FOR COMPARISON OF THE NEWLY-DISPOSED WASTE TO CONSTITUENTS FOUND IN THE SURFACE WATER, SEDIMENT, SOIL AND GROUNDWATER SAMPLES.

11/20/97

(68)

11/20/97

1225: YOUNG COLLECTS SAMPLE WST-1 FROM NEWLY DEPOSITED PAPER MILL SLUDGES. THE SAMPLE IS COLLECTED BY FILLING TWO 8OZ BOTTLES (ONE FOR SVOCS/PCBS) (ONE FOR TOTAL APPIX METALS + Ti) AND USING A PRE CLEANED SPOON DIRECTLY INTO THE BOTTLES

PHOTO#	DIR	DATE	TIME	DESCRIPTION
R4-17	S	11/20/97	1230	VIEW OF PILES WHERE WST-1 WAS COLLECTED (COLLECTED FROM PILE IN FOREGROUND)

WST-1 IS A GREY WHOLE MATERIAL W/ OBVIOUS PAPER FIBERS, AND WITH A CLAY CONSISTENCY. IT IS VERY ELASTIC.

11/20/97

(69)

11/20/97

1235: YOUNG GOES OVER ANALYTICAL PROCEDURE REQUIREMENTS FOR SAMPLES, WITH CLAYTON EBSCH OF BEI. YOUNG SUPPLIES EBSCH W/ COPY OF THE FINAL SAP TABLES - ATTACHMENTS 1 AND 2.

1245: EBSCH LEAVES SITE. THE TECHLAW SAMPLING TEAM PLACES ALL CONTAMINATED PPE INTO A 55-GALLON DRUM AND LABELS IT "INVESTIGATION-DERIVED WASTE" - "PPE". ALL 3 DRUMS ARE LABELED "INVESTIGATION DERIVED WASTE", WITH THE SECOND IDENTIFIED AS "DRILL CUTTINGS", AND THE THIRD AS "DECONTAMINATION AND PURGE WATER." THE DRUMS ARE ALL CLOSED BEFORE THE SAMPLING TEAM LEAVES THE SITE.

11/20/97

11/20/97

1305: SAMPLING TEAM LEAVES THE SITE.

PHOTO #	DIR	DATE	TIME	DESCRIPTION
RY-18	W	11/20/97	1305	CLOSE-UP VIEW OF 10W DRUMS BEFORE TEAM LEAVES THE SITE
RY-19	NW	11/20/97	1306	VIEW OF THE ENTRANCE GATE TO THE RMA. NOTE DRUMS ON WEST SIDE OF ENTRANCE GATE, IN BACKGROUND.

11/20/97

11/20/97

1700: THE SAMPLING TEAM STOPS AT FEDERAL EXPRESS TO PERFORM FINAL PACKAGING OF SAMPLES COLLECTED ON 11/19/97 AND 11/20/97. SAMPLE TAGS ARE PLACED ON EACH BOTTLE; THE BOTTLES ARE PLACED INTO PLASTIC BAGGIES, THEN INTO BUBBLE WRAP, AND PLACED INTO COOLERS W/ ICE FOR SHIPMENT VIA FED EX. CUSTODY SEALS ARE SIGNED AND PLACED ON COOLERS BEFORE THEY ARE TAPED SHUT. THE FOLLOWING CHAIN OF CUSTODY FORMS ARE SHIPPED W/ SAMPLES VIA THE FOLLOWING FED EX AIRBILLS.

COCs #s	AIRBILL #s
11061/11060	5376196011
~~11060~~ RY 11/20/97	~~" "~~ RY 11/20/97
11063	" "
11062	ALL FED EX AIRBILL NUMBERS THE SAME - ALL SAMPLES SHIPPED ON MULTIPLE PACKAGE SHIPMENT LABELS
INTERTEK COC - SIGNED BY R. YOUNG - 2 PAGES	
INTERTEK COC - SIGNED BY A. MURREN	

11/20/97

11/20/97 (72)

1900: SAMPLING TEAM RELINQUISHES SAMPLES TO FED EX, AND SHIPS SAMPLES FROM FED EX LOCATION IN MILWAUKEE WISCONSIN. THE TEAM RETAINS CUSTODY ON ALL SAMPLES UNTIL RELINQUISHMENT TO FED EX.

11/20/97

11/20/97 (73)

2200: YOUNG FINDS COOLER IN TRUCK W/ SAMPLES FOR VOCS ANALYSIS, INCLUDING GW-1, SW-2, TB-2, SW-1 AND GW-2. THESE SAMPLES WERE IN THE LOCKED VEHICLE, UNDER YOUNG'S AND T.QUILLON'S CUSTODY, BUT WERE NOT SENT TO THE LAB. YOUNG KEEPS CUSTODY OF SAMPLES, IN COOLER, W/ ICE, OVERNIGHT, UNTIL HE RELINQUISHES TOMORROW.

11/20/97

11/21/97 (74)

0900: YOUNG RELINQUISHES SAMPLE COOLER TO QUILLEN, WHO SHIPS COOLER W/ COC# 11064 TO THE INTERTEK LAB IN RICHARDSON, TX. THE SAMPLES ARE ALL PACKAGED AS DESCRIBED ON PAGE 71 AND SHIPPED VIA FED EX AIR BILL NUMBER 5376196000.

11/21/97

11/21/97 (75)

1000: YOUNG SPEAKS W/ TERRI ROHNE, SAMPLE COORDINATOR FOR INTERTEK TESTING SERVICES IN RICHARDSON, TX. MR. YOUNG CONFIRMS THAT SLG-( ) AND SLG- ( ) ARE INCORRECTLY LABELED ON THE CHAIN OF CUSTODY FORM 11061. THE SAMPLE NUMBERS ARE ACTUALLY SLG-( ) AND SLG- ( ), RESPECTIVELY. MR QUILLEN CONFIRMS THIS DISCREPANCY. YOUNG (TECHLAW) AND ROHNE (INTERTEK) REVISE THE CHAIN OF CUSTODY FORMS TO REFLECT THE CORRECT SAMPLE DESIGNATIONS.

1515: YOUNG INFORMS MS. ROHNE OF INTERTEK THAT THE LAST SW-2 DESIGNATION OF COC# 11064 (LAST LINE OF COC) SHOULD BE GW-2, WHICH WAS COLLECTED AT 1630 ON 11/19/97. YOUNG AND ROHNE CHANGE COCS TO REFLECT THIS REVISION.

11/21/97

11/21/97

EARLIER IN THE DAY, YOUNG RECEIVES A REQUEST FROM CLAYTON EBSCH OF BITTNER ENGINEERING TO SEND, VIA FACSIMILE, COPIES OF ALL COC RECORDS TO HIM AT BITTNER. YOUNG CALLS DIANE SHARROW OF US EPA FOR APPROVAL TO SHIP/FAX THE COC COPIES.

11/21/97

11/25/97

1000: YOUNG NOT IN OFFICE ON 11/24/97. ON 11/24/97, VIA VOICE MAIL, MS. SHARROW (US EPA) APPROVES A FACSIMILE COPY OF COCS TO BE SENT TO MR. CLAYTON EBSCH OF BITTNER ENGINEERING. A COPY IS SENT VIA FACSIMILE TO MR. EBSCH.

1300: MR. EBSCH RECEIVED A COPY OF THE COCS WITHOUT THE SW-2 CHANGE TO GW-2 ON COC* 11064 (THE COPIES WERE MADE EARLY ON 11/21/97), SO YOUNG CALLS MR. EBSCH TO INFORM HIM OF THIS REVISION. MR. EBSCH CONFIRMS THAT HE RECEIVED THE COPIES OF THE COCS.

11/25/97

TODOs –

① MARK IDW DRUMS

② BLANKS – SW + WASTE

③

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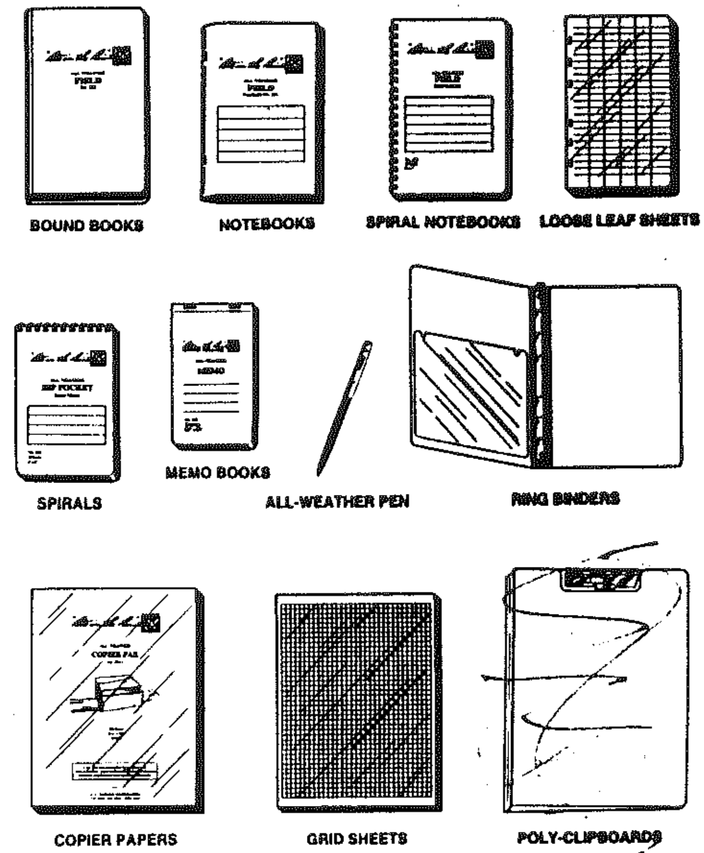

Field data . . . if it's worth collecting, it's worth protecting.

MEASUREMENT CONVERSIONS

IF YOU KNOW	MULTIPLY BY	TO FIND
LENGTH		
inches	2.540	centimeters
feet	30.480	centimeters
yards	0.914	meters
miles	1.609	kilometers
millimeters	0.039	inches
centimeters	0.393	inches
meters	3.280	feet
meters	1.093	yards
kilometers	0.621	miles
WEIGHT		
ounces	28.350	grams
pounds	0.453	kilograms
grams	0.035	ounces
kilograms	2.204	pounds
VOLUME		
fluid ounces	29.573	milliliters
pints	0.473	liters
quarts	0.946	liters
gallons (U.S.)	3.785	liters
milliliters	0.033	fluid ounces
liters	1.056	quarts
liters	0.264	gallons (U.S.)

TEMPERATURE

°C = (°F - 32) x .555
°F = (°C x 1.8) + 32

Inches	Decimals of foot	Millimeters
1/16	.0052	1.5875
1/8	.0104	3.1750
3/16	.0156	4.7625
1/4	.0208	6.3500
5/16	.0260	7.9350
3/8	.0313	9.5250
1/2	.0417	12.700
5/8	.0521	15.875
3/4	.0625	19.050
7/8	.0729	22.225
1"	.0833	25.400
2"	.1667	50.800
3"	.2500	76.200
4"	.3333	101.60
5"	.4167	127.00
6"	.5000	152.40
7"	.5833	177.80
8"	.6667	203.20
9"	.7500	228.60
10"	.8333	254.00
11"	.9167	279.40
1 foot	1.0000	304.80

CH CM

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TechLaw
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CONTENTS

PAGE	REFERENCE	DATE

1130A 11/16/97

Left home picked up Anthony & Kevin
Met Rob at Lake Forest Oasis.
Arrive Manistique 2330 EST.

11/17/97

0810 Met Diane Sharrow at Howard Johnsons, Drove to Manistique Papers Mill.
0830 Met Jim Cook (Manistique papers Inc (MPI)) and Clayton Ebbs Bittner
0915 Went on site w/ Clayton IDentified Staging area, Identified IDW Drum storage Area.
0925 Anthony & Kevin arrived
0930 Set up Decon area
0940 Started reconnaisance of Site walk around

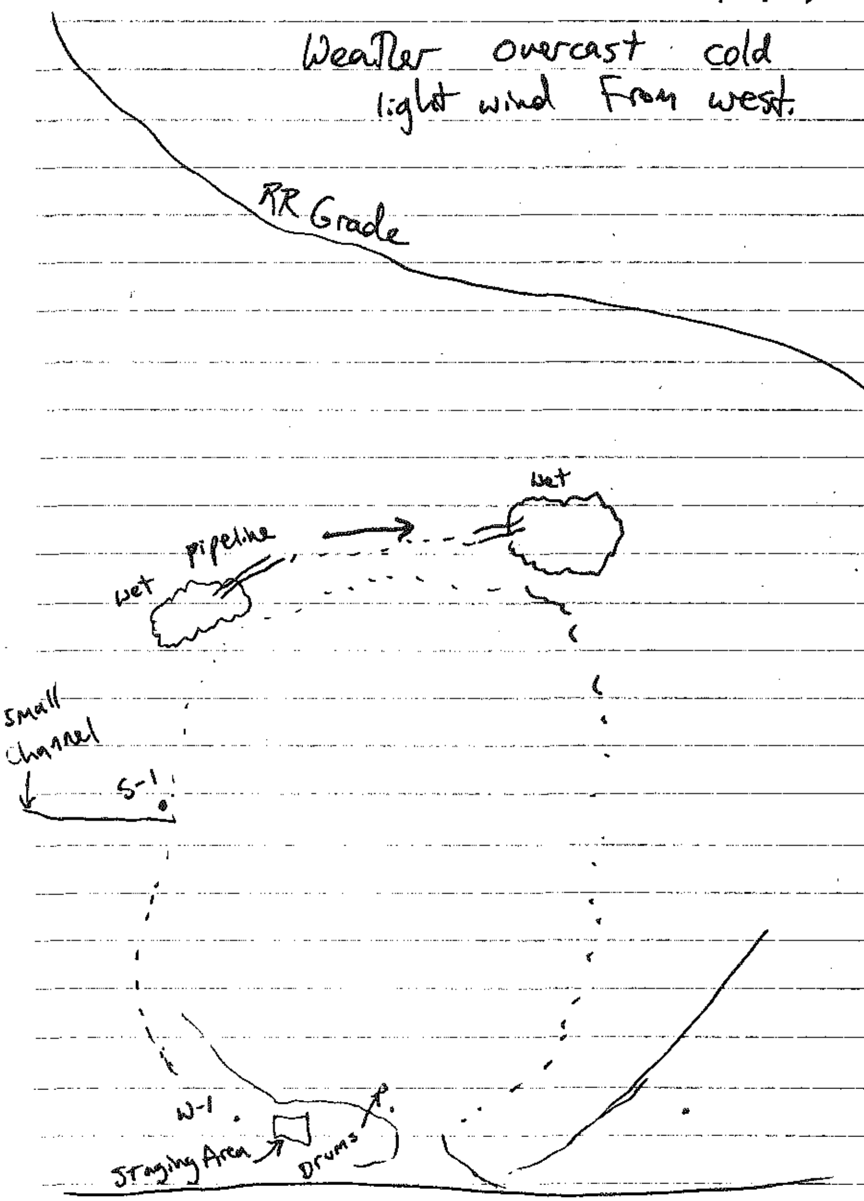
Observations - Toe of RMA pile is 5-6' High Avg. Shows definite slump features including small scale normal faulting and trees being knocked over. Clayton is not aware of any studies of slumping movement

~~12:00~~ 12:30 ~~am~~ left for lunch
1:45 returned to site sampled SW/SED-5 and Dup SW/SED 10
Sampled SW/SED-6 and MS/MSD
1800 left site

Photo	View	Time	
1-1	N	1020	Orange Flag marking ~~wetland~~ SW/Sed-6 in wet area Sampling personnel near new monitoring well.
1-2 1600	N	1600	SW/SED-5 & Dup Location From RMA
1-3	NW	1604	A/A from Close
1-4	W	1623	SW/SED-6 + MS/MSDs for right of Flag In broken ice.

TQ

Weather overcast cold light wind From west.



TQ

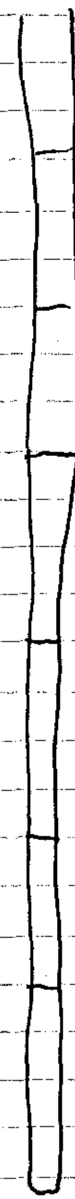
11/17/97

Sample Packaging

		TAg #s
SW-5	VOCs	1828 - 1830
	Sulfides	1831
	metals	1832
SW-10	VOCs	1833 - 1835
	Sulfides	1836
	Metals	1837
SED-5	PCB / SVOC	1838
	metals	1839
SED-10	PCB/SVOC	1840
	Metals	1841
SW-6	VOC	1842 - 1844
	VOC MS	1845 - 1847
	VOC MSD	1848 - 1850
EB-1	SVOC	1851 - 1852
	PCB	1853
	Metals	1854
SW-6	Sulfide / MS / MSD	1855 / 56 / 57
	Metals / MS / MSD	1858 / 59 / 60
SED-6	PCB / SVOC	1861 - 1863
	Metals / MSMSD	1864 - 1865

11/18/97

VOC / SVOC - 1 each/body



VOC/SVOC
Metals/sulfides

PCB
metals/sulfides

PCB/
metals sulfides

Screen
Send only
One

TCLP metals

0950 Started B-1 hit Limerock at 3 Feet. Containerized cuttings
0957 Started B-1 relocated after low recovery in 0-4 and 4-8 Feet intervals

On site for Waste Samples

Terry Myer	Matrix
Eric ___	Matrix
Robert Schmeling	~~MDNR~~ MDEQ
Hank Switzer	~~MDNR~~ MDEQ
Frank Chenier	Bitner Engineering
Anthony / Todd	Techlaw

Frank is present to split samples

TO

SLG-1

0-1	Sludge grey	
1-3	Limerock road bed, tan, some coarse gravel	
3-4	Topsoil?, organic, black	
4-5	hit wood, blocked geoprobe collected only 8" of sample hole abandoned moved 4 feet south	
0-1	Sludge grey	0-0.4
1-3	Limerock road bed, tan, some coarse gravel	0-0.4
3-4	Topsoil (Fly ash according to Ron from MDEQ) organic black.	0.4-1.4
4-5'	Obstruction, possibly limerock this time, blocked probe opening. approx 6" of recovery.	

Abandoned hole. Moved approx 125' east to new SLG-1 location.

TO

SLG-1 (d)

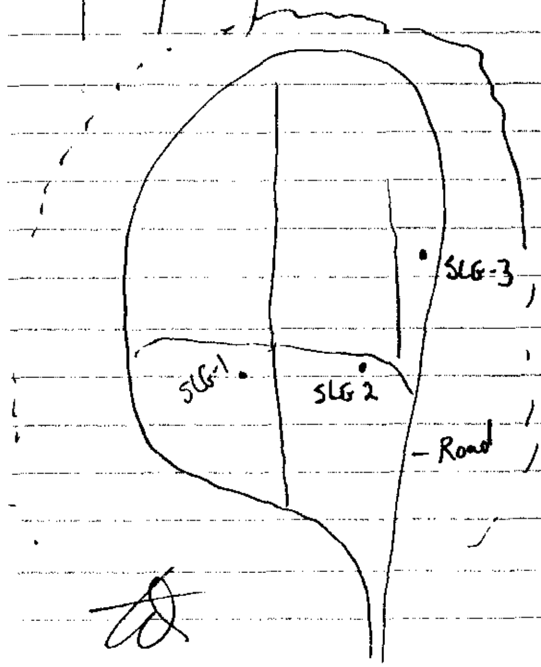
11/18/97

0-3 Topsoil or Flyash, organic black 0-1.6 ppm PID
3-4 Sludge grey 1.6-2.2 ppm PID
4-8. No recovery. Hypothesized material may not have enough moisture to stay in tube.
8-10 No recovery
10-11 grey sludge 1.1-2.2
11-12 Topsoil/Flyash, black organic VOC 2.2-3.3
VOC/SVOC prioritize over metals
Voc sample collected from 11-12 portion. Had odor when cut open
12-14 no recovery
14-16 - Topsoil Flyash black organic 1.1-2.2
15-16 - grey sludge wood at 15' (2" of solid wood) 2.2-4.5 ppm PCB/metals
16-20 No recovery, hole is staying open liner is clean on inside. will try basket on 20-24' interval
20-23' No recovery
23-24' Sludge, grey, wet. no PID because disturbed (some in tube, some in catcher basket, some in bit)
24-26 Sludge grey wet PCB/metals
no pid because disturbed. Sleeve stuck in tube had to cut it

11/18/97

out in pieces
26-28 Native soil brown sand with wood
27-28 Sand grey brown, wet. end of boring

Photo	View		
2-1	SW	1215	Boring location SLG-1 located to left of vehicles
2-1	SW	1216	Same but closer. SLG-1 location may be seen in bottom center of photo



1330 started SLG-2
Located ESE of SLG-1

0-2' Topsoil Flyash, black, organic hit wood at 2 feet
2-4' No recovery
4-5' ~~Bk~~ Sludge, grey, wet 0-0.8ppm wood in bit
5-8' No recovery
8-12' No recovery, hole caved in w/ wet sludge to 7.5 feet hole abandoned. Moved approx 30 feet North east.

0-2' Topsoil/Flyash 0-8" Sludge 8-12" Topsoil/Flyash 12"-20" Topsoil/Flyash 20-24"
2-4' No recovery
4-6' Sludge mixed with some Flyash and organics, some wood 0-2.0 ppm (up to 5.5 in wood layer)
6-8' No recovery
8-12' No recovery (2" Sludge 4" wood debris did not scan
12-16 No recovery (4" sludge trapped in basket and Geoprobe bit.
16-18 No Sludge, Grey PCB/Metals pure sludge
18-20 recovery

20-22 Sludge Grey PCB/Metals
22-24 Sludge Grey VOC/SVOC
24-26 Sludge grey with some sand, very wet. Too few solids so no sample collected.
26-28 Sand, light brown, fine to med.

SLG-32 Dup for PCB For SLG-2 20-22 Feet
1510 end of boring

1520 Started SLG-3

0-1.5 Topsoil /Flyash 0-2.0
1.5-4 Sludge 2.0-5.3
4-8 Sludge 4.0-5.3
8-11 Sludge PCB+Dup 1.5-5.6
11-12 No recovery
12-13 Sludge (VOC) 2-8.3
13-14 Fly ash
14-16 No Recovery
16-18 Sludge 2-4.0 3-5.3
18-19 Brown sand wet med to coarse
19-20 Sludge 3-5.3

Use immunoassay on 18-20 and 8-10, Both are likely (?)

20-21 Sludge 2-4.0

21-22 Sand med to coarse wet brown 2-5.6

22-24 Sludge 5-8.0

24-26 Sand and some Sludge, med to coarse, brown. Sludge in isolated clumps (apparently

26-28 Sludge

28-30 Sludge

30-31 Brown Sand med to coarse

31-32 Sludge (Stiff)

end of hole all samples collected

SLG-1 Inventory 1100

2-4 | 8oz TCLP

10-12 | 8oz SVOC, metals

10-12 | 4oz VOC

~~14-16 | 8oz PCB~~

~~14-16 | 8oz Metals~~

24-26 | 8oz Metals

24-26 | 8oz PCBs

SLG-2 Inventory 1430

0-2 | 8oz TCLP

~~16-18 | 8oz PCB~~

~~16-18 | 4oz Metals~~ Metals

~~16-18 | 8oz Metals MS/MSD~~

20-22 | 8oz Metals

20-22 | 8oz PCB

20-22 | 8oz Metals Dup SLG-32 (20-22) Metals

22-24 | 4oz VOC

22-24 | 8oz SVOC

22-24 | 8oz Metals

SLG-3 Inventory 1600

~~8-10 | 8oz PCB~~

~~8-10 | 8oz PCB DUP SLG-33 (8-10)~~ PCB

~~8-10 | 8oz Metals~~

12-14 | 4oz VOC

12-14 | 8oz SVOC, Metals

18-20 | 8oz PCB

18-20 | 8oz Metals

24-26 | 8oz TCLP Metals

24-26 | 8oz TCLP Metals Dup SLG-33 (24-26) TCLP

Weather
Overcast to ~~par~~ mostly cloudy
Cold (in The 30°F's) light winds
From The west
Drillers left site at 1640
Frank left at 1630
TechLaw left at 1745

		TAG #	
SLG-2 (0-2)	TCLP Metals	1785	
SLG-2 (22-24)	Metals	1786	
SLG-2 (22-24)	SVOC	1787	
SLG-32 (20-22)	Metals	1788	Dup
SLG-3 (20-22)	Metals	1789	
SLG-2 (20-22)	PCB	1790	
SLG-2 (22-24)	VOC	1791	out of order
~~SLG-2 (16-18)~~	PCB	~~1792~~	not sent Immunoassay
~~SLG-2 (16-18)~~	Metals/MSMSD	~~1793~~ ~~94~~	not sent Immunoassay
SLG-3 8-10	PCB	~~1795~~	not sent (based on Immunoassay)
SLG-3 8-10	Metals	~~96~~	not sent (based on Immunoassay)
SLG-33 8-10	PCB	~~97~~	not sent (based on Immunoassay)
SLG-3 12-14	SVOC, Metal	98	
SLG-3 12-14	VOC	99	
SLG-3 18-20	PCB	1800	
SLG-3 18-20	Metals	1801	
SLG-33 24-26	TCLP metal	1802	
SLG-3 24-26	TCLP	1803	
SLG-1 (2-4)	TCLP metals	1804	
(10-12)	VOC	1805	
(10-12)	SVOC + Metals	1806	
(14-16)	Metals	~~1807~~	not sent
(14-16)	PCB	~~1808~~	not sent
(24-26)	Metals	1809	
(24-26)	PCB	1810	

Arrived on site 0905
SLG-4 located NE of
SLG-3

SLG-4
Started at 0945

0-4	Sludge	0-3.0 ppm
4-6	4-5 Flyash/5-6 Sludge	VOC 20.5 ppm
6-8	No recovery	
8-10	Sludge	0-7.0 ppm
10-12	Flyash	3.0-5.0 ppm
12-13	Sludge	0-3.5 ppm
13-14	Flyash	
14-15	Sludge	
15-16	Flyash	
16-17	Sludge	0-2.0 ppm
17-18	wet Sludge w/ Native material	0-2.0 ppm
18-20	Sludge	0-4.0 ppm
20-21	Sludge, wood in bit mixed with dark oily/silty natural Matrix.	
21-24	No recovery	
~~20~~ 24-27	No recovery	
27-28	~~dark~~ Sand and river gravel, dark brown matrix. gravel was white and rounded some sludge associated with interval	

Finished SLG-4 at
1045
1100 On location at SLG-5
located NorThEast of SLG-4
Location selected based on
identification of "River gravel"
in SLG-4. IF The river gravel
represents settling pond / Deinking lagoon
Sludges dumped in The RMA, and
if They were detected as far
north as SLG-4, Then They
May be in SLG-5

0-3	Interlayered Sludge and Limerock gravel roadbed	0-6.3 ppm
3-4	No recovery	
4-8	No recovery (4" gravel in tube)	
8-10	Sludge with 6" Flyash on top	0-6 ppm ~30 ppm @ 12
10-12	Sludge	0-4 ppm
12-16	Sludge	0-5 ppm 25 ppm at 15"
16-19	Sludge	PCBs 2-12 ppm
17-18	Flyash wet	
18-19	Sludge	8-11 ppm
19-20	No Recovery	
20-24	Discarded. Believed to be material that fell into hole	

SLG-5 Finished at noon
Waste QC samples

	VOC	SVOC	metal	TCLP	PCB
Dup	SLG35 8-10				

1410 started installing geoprobe well point at bkg location near W-4 (located app 50 feet east of W-4 on Frankovich Road) in grass.

Photo	view	Time	Desc
3-1	ESE	1430	W-4 and W-4 replacement well in Foreground with GW sampling well point installation location in center of photograph
3-2	E	1431	Well Point prior to purging w/ vacuum

1435 purged GW bkg location near W-4 Will be called GW-1.
Anthony & Todd bailed wells, Russ, From Bittner, held bottles.
1625 completed sampling
1630 Abandoned well point pulled out pvc, Filled boring w/ Bentonite chips.
1645 Collected EQuipment Blank EB-2 off of 4' Geoprobe sampler

Arrived on site at 0830
set up decon station and
waited for Clayton who arrived
at 0845
Went out to MW-7 with
Anthony. Well was inaccessible
due to wetlands so we gathered
Fallen wood to build a bridge
For access. 0945 opened well
pid 0.0 ppm
Top of water 2.55 Feet } Volume in
bottom of well 6.35 Feet } 2" well ≥ 2 gal
After 2 ~~liters~~ gallons purged
Temp 41.8 °F
Cond 1.90
pH 10.7
After 3 gallons
Temp 41.2 °F
Cond 1.92
pH 9.3
After 4 gallons
Temp 41.2
Cond 1.82
pH 8.5

After 5 gallons purged
Temp 41.5
Cond 1.85
pH 8.9
TQ left MW-7 to go to
MW-6 w/ Kevin
Opened well @ 1045
pid = 0.2 ppm
Top of water in well = 4.95
bottom of casing = 5.95
Volume in well (2") ≅ 0.5 gallon
Bailed 0.75 liters and less
Than 2" in well. It is
not recharging well
waited 5 min 1 more inch
of water in well
waited 5 min 1 more inch
waited 7 min almost 2" in well
Collected VOC vials at 1145
Collected ½ full jars for metals
w/ A.M.

Done

MEMO

To: Mr. Clayton Ebsch, Bittner Engineering, Inc.
From: Robert Young, TechLaw RY
Subject: Chain of Custody Forms - Manistique Paper RMA
Date: November 25, 1997

Per your request, attached are copies of the chain of custody forms for the samples collected at the Manistique Papers Residual Management Area (RMA) on November 17-20, 1997. If you have any questions concerning the sample analyses, or can not read the facsimile copies, feel free to give me a call at 312/345-8966. You may also call Ms. Diane Sharrow of U.S. EPA Region 5 at 312/886-6199.

cc: D. Sharrow, U.S. EPA Region 5
P. Brown-Derocher, TechLaw

Attention: Terri Kohne 972/238-5591

T. Law, Inc.

A.T. KEARNEY

A.T. Kearney Inc.
222 West Adams
Chicago, IL 60606
312/648-0111

Chain of Custody Record

11055

Project Code: K05020	Samples Shipped To: Inkvek Testing Services, 1089 E. Collins Blvd., Richardson, TX 75081	Samplers Names: Rob Young, Todd Quillen	1) Sample description (Enter in column A): 1. Surface Water 2. Ground Water 3. Leachate 4. Rinsate 5. Soil/Sediment 6. Oil 7. Waste 8. Other (specify)
Project (site) Name: RMA ~~Manistique Papers~~ Dan			2) Preservatives (Enter in column B): 1. HCl 2. HNO_3 3. $Na\,HSO_4$ 4. H_2SO_4 5. Na OH 6. Other (specify) 7. Ice only N. Not preserved
City, State, Zip Code:	Carrier: FEDEX	Samplers Signatures:	
Date Shipped: 11/18/97	Air Bill Number: 5376196081		

Sample Identification Numbers	A. Matrix enter from Box 1	B. Preser. enter from Box 2	Grab or Comp	Number of Sample Containers	MM/DD/YY Time sample collection	Analysis: VOCs	Metals	Sulfides	SVOCs	PCBs					Remarks/ Tag Numbers
SW-6 (MS/MSD)	1	1	G	9	11/17/97, 16:30	✓									KRB 1042-1044, 1845-1847, 1848-1850
Trip Blank	8-DI Water	1	G	2	Lab	✓									Trip Blank
SW-5	1	1	G	3	11/17/97, 15:15	✓									1828-1830
SW-10	1	1	G	3	11/17/97, 15:15	✓									1833-1835
SW-5	1	2	G	1	11/17/97, 15:15		✓								1832
SW-5	1	N	G	1	11/17/97, 15:15			✓							1831
SW-10	1	2	G	1	11/17/97, 15:15		✓								1837
SW-10	1	N	G	1	11/17/97, 15:15			✓							1836
EB-1	8-DI Water	N	G	3	11/17/97, 16:30				✓	✓					Equipment Blank, 1851-1853
EB-1	8-DI Water	2	G	1	11/17/97, 16:30		✓								Equipment Blank, 1854
SW-4	1	1	G	3	11/18/97, 10:40	✓	✓	KRB							1873, 1874, 1877
SW-7	1	1	G	3	11/18/97, 12:00	✓									1778-1780
	KRB 11/18/97														

Relinquished By	Time	Date	Received By	Time	Date	Received By	Time	Date	Received By	Time	Date
Rob Young	1330	11/18	Kevin Higgins	1330	11/18						
Kevin Higgins	1600	11/18									

Remarks: Preserve Sulfide (Surface Water) samples @ Lab

Split Samples — Accepted — Declined (Signature) By Manistique Papers

Distribution: Original — A.T. Kearney, Inc.
Carbon copies — Laboratory, work assignment manager, client (as appropriate)

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A.T. Kearney 1/3907/1 TR

Inc.

A.T. KEARNEY

A.T. Kearney Inc.
222 West Adams
Chicago, IL 60606
312/648-0111

Chain of Custody Record

11046

Project Code: R05020	Samples Shipped To: Inkvkle Testing Services, 1099 E. Collins Blvd., Richardson, TX 75081	Samplers Names: Todd Quillen, Rob Young	1) Sample description (Enter in column A): 1. Surface Water 2. Ground Water 3. Leachate 4. Rinsate 5. Soil/Sediment 6. Oil 7. Waste 8. Other (specify)	2) Preservatives (Enter in column B): 1. HCl 2. HNO_3 3. Na HSO_4 4. H_2SO_4 5. Na OH 6. Other (specify) 7. Ice only N. Not preserved
Project (site) Name: ~~Manistique Papers~~ KRH RMA				
City, State, Zip Code	Carrier: FED EX	Samplers Signatures		
Date Shipped: 11/18/97	Air Bill Number: 5376195952			

Sample Identification Numbers	A. Matrix enter from Box 1	B. Preser. enter from Box 2	Grab or Comp	Number of Sample Containers	MM/DD/YY Time sample collection	PCBs	SVOCs	A-I Metals	Sulfides							Remarks/ Tag Numbers
SLD-5	5	N	C	2	11/17/97, 15:15	✓	✓	✓								1038, 1039
SLD-6 (MS/MSD)	5	N	C	3	11/17/97, 16:30	✓	✓									~~1058, 1059, 1060~~ KRH 1061, 1062, 1063
SLD-6 (MS/MSD)	5	N	C	2	11/17/97, 16:30			✓								1064, 1065 MS/MSD
SW-6 (MS/MSD)	1	N	G	3	11/17/97, 16:30				✓							1055, 1056, 1057
SW-6 (MS/MSD)	1	2	G	3	11/17/97, 16:30			✓								1058, 1059, 1060
SLD-10	5	N	C	2	11/17/97, 15:15	✓	✓	✓								1040, 1041

11/18/97 KRH

Relinquished By	Time	Date	Received By	Time	Date	Received By	Time	Date	Received By	Time	Date
Rob Young	1330	11/18	Kevin Higgins	1330	11/18						
Kevin Higgins	1600	11/18									

Remarks: Preserve sulfide (surface water) samples @ Lab

Split Samples — Accepted — Declined (Signature) By Manistique Papers

Distribution: Original — A.T. Kearney, Inc.
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A.T. Kearney 1/3907/1 TR

To Low, Inc.

Attention: Tarri Rohne 972/220-5511

A.T. KEARNEY

A.T. Kearney Inc.
222 West Adams
Chicago, IL 60606
312/648-0111

Chain of Custody Record

11056

Project Code	Samples Shipped To	Samplers Names	1) Sample description (Enter in column A)	2) Preservatives (Enter in column B)
RUSUZU	Intertek Testing Services 1089 East Collins Blvd. Richardson, TX 75081	Rob Young, Mark Atwasoff	1. Surface Water	1. HC1
Project (site) Name RMA ~~Manistique Papers~~ KRH			2. Ground Water	2. HNO_3
City, State, Zip Code Manistique, MI	Carrier FEDEX	Samplers Signatures	3. Leachate	3. Na HSO_4
Date Shipped 11/18/97	Air Bill Number 5376196070		4. Rinsate	4. H_2SO_4
			5. Soil/Sediment	5. Na OH
			6. Oil	6. Other (specify)
			7. Waste	7. Ice only
			8. Other (specify)	N. Not preserved

Sample Identification Numbers	A. Matrix enter from Box 1	B. Preser. enter from Box 2	Grab or Comp	Number of Sample Containers	MM/DD/YY Time sample collection	SVOCs	VOCs	PCBs	Sulfides	A-1 Metals					Remarks/ Tag Numbers
Sed-4	5	N	C	2	11/18/97, 10:40	✓	✓	✓							1869, 1870
SW-4	1	2	G	1	11/18/97, 10:40				✓						1871
SW-4	1	N	G	1	11/18/97, 10:40			✓							1872
SW-7	1	2	G	1	11/18/97, 12:00				✓						1783
SW-7	1	N	G	1	11/18/97, 12:00			✓							1784
~~SW-7~~ KRH Sed-7	5	N	C	2	11/18/97, 12:00	✓	✓	✓							1781, 1782

KRH 11/18/97

Relinquished By	Time	Date	Received By	Time	Date	Received By	Time	Date	Received By	Time	Date
Rob Young	1330	11/18	Kevin Higgins	1330	11/18						
Relinquished By KH Higgins	11/18	1600	Received By			Received By			Received By		

Remarks Preserve sulfide (surface water) samples @ Lab

Split Samples — Accepted — Declined (Signature) By Manistique Papers

Distribution: Original — A.T. Kearney, Inc.
Carbon copies — Laboratory, work assignment manager, client (as appropriate)

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A.T. Kearney 1/3907/1 TR

T Wlaw, Inc. Attention: Tarri Konne 412/230-5571

A.T. KEARNEY

A.T. Kearney Inc.
222 West Adams
Chicago, IL 60606
312/648-0111

Chain of Custody Record

11058

Project Code: ROSO20	Samples Shipped To: Intertek Testing Services, 1089 E. Collins Blvd. Richardson, TX 75081	Samplers Names: Todd Quillen, Anthony Mubiru	1) Sample description (Enter in column A): 1. Surface Water 2. Ground Water 3. Leachate 4. Rinsate 5. Soil/Sediment 6. Oil 7. Waste 8. Other (specify)
Project (site) Name: RMA			2) Preservatives (Enter in column B): 1. HCl 2. HNO_3 3. Na HSO_4 4. H_2SO_4 5. Na OH 6. Other (specify) 7. Ice only N. Not preserved
City, State, Zip Code: Manistique, MI	Carrier: FEDEX	Samplers Signatures: Todd W. Quillen	
Date Shipped: 11/19/97	Air Bill Number: 5376195996		

Sample Identification Numbers	A. Matrix enter from Box 1	B. Preser. enter from Box 2	Grab or Comp	Number of Sample Containers	MM/DD/YY Time sample collection	TCLP metals	VOC	SVOC	Metals (App IX)	Titanium	Sulfides	PCBs				Remarks/ Tag Numbers
SLG-1 (2-4)	7	N	Grab	1	11/18/97 1100	X										1804
SLG-1 (10-12)	7	N	Grab	1	11/18/97 1100		X									1805
SLG-1 (10-12)	7	N	Grab	1	11/18/97 1100			X	X	X	X					1806
SLG-1 (24-26)	7	N	Grab	2	11/18/97 1100			~~X~~	X	X	X	X				1809, 1810
SLG-2 (0-2)	7	N	Grab	1	11/18/97 1430	X										1785
SLG-2 (22-24) ~~10~~	7	N	Grab	2	11/18/97 1430			X	X	X	X					1786, 1787
★ SLG-2 ~~(20-22)~~ (16-18)	7	N	Grab	2	11/18/97 1420				X	X	X	X				1789, 1790
SLG-2 (22-24) ~~10~~	7	N	Grab	1	11/18/97 1430		X									1791
Not received by ITS → SLG-32 ~~(20-22)~~ (16-18)	7	N	Grab	1	11/17/97 1430				X	X	X					1788
SLG-3 (12-14)	7	N	Grab	1	11/18/97 1600			X	X	X	X					1798
SLG-3 (12-14)	7	N	Grab	1	11/18/97 1600		X									1799
SLG-3 (18-20)	7	N	Grab	2	11/18/97 1600				X	X	X	X				1800, 1801
SLG-3 (24-26)	7	N	Grab	1	11/18/97 1600	X										1802
SLG-33 (24-26)	7	N	Grab	1	11/18/97 1600	X										1803

Relinquished By	Time	Date	Received By	Time	Date	Received By	Time	Date	Received By	Time	Date
Todd W. Quillen	1335	11/19/97	Kevin Fitzgerald	1335	11/19/97						
Kevin Fitzgerald	1100	11/11/97									

Remarks: Do not analyze SLG-1(24-26) for SVOC KF 11/19/97

Split Samples — Accepted — Declined (Signature)

Distribution: Original — A.T. Kearney, Inc.
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A.T. Kearney 1/3907/1 TR

~~To Low, Inc.~~ Attention: Tarri [illegible]

~~AT. ARNEY~~

A.T. Kearney Inc.
222 West Adams
Chicago, IL 60606
312/648-0111

Chain of Custody Record

11057

Project Code: R05020	Samples Shipped To: Inchcape Testing Services, 1089 E. Collins Blvd., Richardson, TX 75081	Samplers Names: Rob Young	1) Sample description (Enter in column A): 1. Surface Water 2. Ground Water 3. Leachate 4. Rinsate 5. Soil/Sediment 6. Oil 7. Waste 8. Other (specify)
Project (site) Name: RMA			2) Preservatives (Enter in column B): 1. HCl 2. HNO_3 3. Na HSO_4 4. H_2SO_4 5. Na OH 6. Other (specify) 7. Ice only N. Not preserved
City, State, Zip Code: Manistique, MI	Carrier: FEDEX	Samplers Signatures: [signature]	
Date Shipped: 11/19/97	Air Bill Number: 5376195974		

Sample Identification Numbers	A. Matrix enter from Box 1	B. Preser. enter from Box 2	Grab or Comp	Number of Sample Containers	MM/DD/YY Time sample collection	Analysis: VOCs	SVOCs	PCBs	Sulfide	Appendix 9 Metals Titanium					Remarks/ Tag Numbers
Sed-3	5	N	G	2	11/18/97, 1600	~~TPH~~	✓	✓		✓					1890, 1895
SW-3	1	HNO3	G	1	11/18/97, 1600					✓					1889
SW-3	1	N	G	1	11/18/97, 1600				✓						1893
SW-3	1	HCl	G	3	11/18/97, 1600	✓									1894, 1892, 1891
Sed-B	5	N	G	2	11/18/97, 1415		✓	✓		✓					1887, 1888
SW-B	1	HNO3	G	1	11/18/97, 1415					✓					1885
SW-B	1	N	G	1	11/18/97, 1415				✓						1886
SW-B	1	HCl	G	3	11/18/97, 1415	✓									1882, 1883, 1884
TB-2	8-DI Water	HCl	G	2	——	✓									Trip Blank 1898, 1899

Relinquished By	Time	Date	Received By	Time	Date	Received By	Time	Date	Received By	Time	Date
[signature]	1945	11/18/97	[illegible]	[illegible]	[illegible]						
Relinquished By: [illegible]	[illegible]	[illegible]	Received By	Time	Date	Received By	Time	Date	Received By	Time	Date

Remarks

Split Samples — Accepted — Declined (Signature)

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A.T. Kearney 1/3907/1 TR

1FZHZAW

RM 11/20/97

A.T. KEARNEY

A.T. Kearney Inc.
222 West Adams
Chicago, IL 60606
312/648-0111

Chain of Custody Record

11061

Project Code	R05020
Project (site) Name	RMA
City, State, Zip Code	MANISTIQUE, MI
Date Shipped	11/20/97
Samples Shipped To	Terri Rhone, Intertek Testing Services, 1089 E. Collins Blvd, Richardson, TX 75081
Carrier	FedEx
Air Bill Number	5376196011
Samplers Names	Todd Quillen, Anthony Mubiru
Samplers Signatures	Todd W. Quillen; Anthony Mubiru

1) Sample description (Enter in column A)
1. Surface Water
2. Ground Water
3. Leachate
4. Rinsate
5. Soil/Sediment
6. Oil
7. Waste
8. Other (specify)

2) Preservatives (Enter in column B)
1. HCl
2. HNO_3
3. Na HSO_4
4. H_2SO_4
5. Na OH
6. Other (specify)
7. Ice only
N. Not preserved

Sample Identification Numbers	A. Matrix enter from Box 1	B. Preser. enter from Box 2	Grab or Comp	Number of Sample Containers	MM/DD/YY Time sample collection	VOCs	TCLP Metals	PCBs	App IX Metals	Titanium	Sulfides	SVOCs	Remarks/ Tag Numbers
SLG-35 (8-10)	7	N	G	1	11/19/97 1130	X							1825
SLG-4 (12-14)	7	N	G	3	11/19/97 1000		X						1826, 1900, 1910
SLG-4 (16-18)	7	N	G	4	11/19/97 1000			X					1827, 1906, 1905, 1916
SLG-4 (4-6)	7	N	G	1	11/19/97 1000	X							1901
SLG-35 (16-18)	7	N	G	2	11/19/97 1130			X					1902, 1904
SLG-5 (8-10)	7	N	G	2	11/19/97 1130	X							1903, 1907
SLG-4 (16-18)	7	N	G	1	11/19/97 1000				X	X	X		1908
SLG-5 (8-10)	7	N	G	1	11/19/97 1130							X	1913
SLG-5 (8-10)	7	N	G	1	11/19/97 1130				X	X	X		1917
SLG-5 (16-18)	7	N	G	1	11/19/97 1130				X	X	X		1911
SLG-5 (16-18)	7	N	G	1	11/19/97 1130			X					1909
SLG-4 (4-6)	7	N	G	1	11/19/97 1000				X	X	X	X	1912
SLG-35 (8-10)	7	N	G	1	11/19/97 1130							X	1915
SLG-5 (14-16)	7	N	G	1	11/19/97 1130		X						1914

Relinquished By	Time	Date	Received By	Time	Date	Received By	Time	Date	Received By	Time	Date
Todd W. Quillen	1900	11/20/97									
Relinquished By	Time	Date	Received By	Time	Date	Received By	Time	Date	Received By	Time	Date

Remarks Additional sample volume for SLG-5(8-10) SVOC & MS/MSD may be taken from SLG-5(8-10) Metals container tag # 1917

Split Samples — Accepted — Declined (Signature)

Distribution: Original — A.T. Kearney, Inc.
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A.T. Kearney 1/3907/1 TR

TECHLAW

~~A.T. KEARNEY~~

A.T. Kearney Inc.
222 West Adams
Chicago, IL 60606
312/648-0111

Chain of Custody Record

11060

Project Code: [illegible]	Samples Shipped To: [illegible] Intertek Testing Services, 1089 E. Collins Blvd. Richardson, TX 75081	Samplers Names: Todd Quillen, Rob Young
Project (site) Name: RMA		
City, State, Zip Code: Manistique, MI	Carrier: FEDEX	Samplers Signatures:
Date Shipped: ~~11/19/97~~ ~~11/24/97~~ 11/20/97	Air Bill Number: 537619 6011	

1) Sample description (Enter in column A)
1. Surface Water
2. Ground Water
3. Leachate
4. Rinsate
5. Soil/Sediment
6. Oil
7. Waste
8. Other (specify)

2) Preservatives (Enter in column B)
1. HCl
2. HNO_3
3. Na HSO_4
4. H_2SO_4
5. Na OH
6. Other (specify)
7. Ice only
N. Not preserved

Sample Identification Numbers	A. Matrix enter from Box 1	B. Preser. enter from Box 2	Grab or Comp	Number of Sample Containers	MM/DD/YY Time sample collection	Analysis: SVOCs	PCBs	App. IX Metals	Titanium							Remarks/ Tag Numbers
Sed-1	5	N	G	2	11/19/97 1110	X	X	X	X							1813, 1814
Sed-2	5	N	G	2	11/19/97 1000	X	X	X	X							1815, 1816
SS-1	5	N	G	2	11/20/97 0920	X	X	X	X							1982, 1983
SS-2	5	N	G	2	11/20/97 1000	X	X	X	X							1984, 1985
WST-1	7	N	G	2	11/20/97 1225	X	X	X	X							1986, 1987

Relinquished By	Time	Date	Received By	Time	Date	Received By	Time	Date	Received By	Time	Date
Todd W. Quillen	[illegible]	[illegible]									
Relinquished By	Time	Date	Received By	Time	Date	Received By	Time	Date	Received By	Time	Date

Remarks

Split Samples — Accepted — Declined (Signature)

Distribution: Original — A.T. Kearney, Inc.
Carbon copies — Laboratory, work assignment manager, client (as appropriate)

Page 2 of 2

A.T. Kearney 1/3907/1 TR

Tech Law, Inc.

A.T. KEARNEY — A.T. Kearney Inc. 222 West Adams Chicago, IL 60606 312/648-0111

Chain of Custody Record

11602

Project Code R05020	Samples Shipped To Intertek Testing Services 1089 E. Collins Blvd. Richardson, TX	Samplers Names Todd Quilter ~~Rob Young~~ KRH 11/20/97 Anthony Mabora	1) Sample description (Enter in column A) 1. Surface Water 2. Ground Water 3. Leachate 4. Rinsate 5. Soil/Sediment 6. Oil 7. Waste 8. Other (specify)
Project (site) Name RMA			2) Preservatives (Enter in column B) 1. HCl 2. HNO_3 3. $NaHSO_4$ 4. H_2SO_4 5. NaOH 6. Other (specify) 7. Ice only N. Not preserved
City, State, Zip Code Manistique, MI	Carrier FEDEX	Samplers Signatures Anthony Mabora Todd W. Quilter	
Date Shipped 11/20/97	Air Bill Number 5370196011		

Sample Identification Numbers	A. Matrix enter from Box 1	B. Preser. enter from Box 2	Grab or Comp	Number of Sample Containers	MM/DD/YY Time sample collection	Analysis: Metals (App IX + Ti)	Sulfide	Nitrate/Nitrite*	PCBs	Remarks/ Tag Numbers
W-7 (MS/MSD)	2	2	G	3	11/20/97, 10:45	✓				1953, 1948, 1956
W-7 (MS/MSD)	2	N	G	3 KRH	11/20/97, 10:45		✓	✓		1952, 1954, 1949
W-7 (MS/MSD)	2	N	G	3	11/20/97, 10:45				✓	1955, 1950, 1951
	~~2~~		~~G~~	KRH						
	~~2~~		~~G~~	KRH						

KRH 11/20/97

Relinquished By	Time	Date	Received By	Time	Date	Received By	Time	Date	Received By	Time	Date
Anthony Mabora	18:00	11/24/97	Kirk Higgins	18:00	11/24/97	Sandy Gray	0915	11/25/97			
Kirk Higgins	19:00	11/24/97									

Remarks * Preserve Sulfide samples @ Lab
W-7 is the MS/MSD SAMPLE

Split Samples — Accepted — Declined (Signature)

Distribution: Original — A.T. Kearney, Inc.
Carbon copies — Laboratory, work assignment manager, client (as appropriate)

Page 1 of 1

A.T. Kearney 1/3907/1 TR

TO HLAW

RM.
11/20/97

~~A.T. KEARNEY~~

A.T. Kearney Inc.
222 West Adams
Chicago, IL 60606
312/648-0111

Chain of Custody Record

11063

Project Code: R05-020	Samples Shipped To: TERRI RITONE, INTERTECK TESTING SERVICES, 1089 E. COLLINS BLVD. RICHARDSON, TX 75081	Samplers Names: ROB YOUNG, TODD QUILLEN, ANTHONY MUBIRU	1) Sample description (Enter in column A): 1. Surface Water 2. Ground Water 3. Leachate 4. Rinsate 5. Soil/Sediment 6. Oil 7. Waste 8. Other (specify)
Project (site) Name: RMA			2) Preservatives (Enter in column B): 1. HC1 2. HNO_3 3. Na HSO_4 4. H_2SO_4 5. Na OH 6. Other (specify) 7. Ice only N. Not preserved
City, State, Zip Code: MANISTIQUE, MI	Carrier: FED EX	Samplers Signatures: [signatures]	
Date Shipped: 11/20/97	Air Bill Number: 537619 6011		

Sample Identification Numbers	A. Matrix enter from Box 1	B. Preser. enter from Box 2	Grab or Comp	Number of Sample Containers	MM/DD/YY Time sample collection	Analysis: SVOCs	PCBs	APP IX METALS	TITANIUM	SULFIDES	NITRATE-NITRITE				Remarks/ Tag Numbers
EB-2	4	N	G	2	11/19/97 1645	X									1123, 1124
EB-2	4	N	G	1	11/19/97 1645		X								1125
EB-2	4	~~N~~ 2	G	1	11/19/97 1645			X	X						1122
EB-2	4	N	G	1	11/19/97 1645					X					1121
W-17	2	N	G	2	11/20/97 1045	X									1972, 1973
W-17	2	N	G	1	11/20/97 1045		X								1974
W-17	2	~~N~~ 2	G	1	11/20/97 1045			X	X						1975
W-17	2	N	G	1	11/20/97 1045					X	X				1976 RM 11/20/97
~~EB-3~~	~~4~~	~~2~~	~~G~~	~~1~~	~~11/20/97 0840~~			X	X						~~1177~~
~~EB-3~~	~~4~~	~~N~~	~~G~~	~~1~~	~~11/20/97 0840~~					X					~~1178~~ RM 11/20/97
W-6	2	2	G	1	11/20/97 1145			X	X						1947

Relinquished By	Time	Date	Received By	Time	Date	Received By	Time	Date	Received By	Time	Date
Todd W. Quillen	1800	11/20/97									
Relinquished By	Time	Date	Received By	Time	Date	Received By	Time	Date	Received By	Time	Date

Remarks: PRESERVE SULFIDE SAMPLES IN LABORATORY

Split Samples — Accepted — Declined (Signature)

Distribution: Original — A.T. Kearney, Inc.
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Page ___ of ___

A.T. Kearney 1/3907/1 TR

ITS Environmental Laboratories 1089 East Collins Blvd., #100 Richardson, TX 75081 (972) 238-5591

CHAIN OF CUSTODY RECORD

Report to:
Company: Techlaw, Inc.
Address: 10 S. Wacker Dr. Ste. 2100, Chicago IL 60606
Contact: Rob Young
Phone: 312/345-8966
Fax: 312/578-8904
Contract/Quote #:

Invoice to
Company: Techlaw, Inc
Address: 10 S. Wacker Dr. Ste. 2100, Chicago, IL 60606
Contact: Rob Young
Phone: 312/345-8966
PO/SO #: R05-020

Sampler's Name: Anthony Mubiru
Sampler's Signature: Anthony Mubiru

Proj. No.: R05-620
Project Name: RMA

ANALYSIS REQUESTED: SVOC; App IX Metals (1958, 1959, 1960); Titanium (1961); Sulfide (1962); VOCs

Lab use: Due Date
Temp. of coolers when received (C°): 1 2 3 4 5
Custody Seal N / Y
Intact N / Y
Screened For Radioactivity

Matrix[1]	Date	Time	Comp	Grab	Identifying Marks of Sample(s)	VOA	A/G 1 Lt.	250 ml	P/O	SVOC	App IX Metals	Titanium	Sulfide	VOCs	Lab Sample ID (Lab Use Only)
W	11/20/97	1045		X	W-7 (MS/MSD)		6			X					1957 — 1962
W	11/20/97	0840		X	EB-3				1		X	X			1977
W	11/20/97	0840		X	EB-3				1				X		1978
W	11/20/97	1020 1045 AM 11/20/97		X	W-17	3								X	1969 — 1971
W	11/19/97	1645		X	EB-2	3								X	1918 — 1920
W	11/20/97	1045		X	W-7 (MS/MSD)	6								X	1963 — 1968
W	11/20/97	1145		X	W-6	3								X	1944 — 1946
W	11/20/97	0840		X	~~E~~ B-3	3								X	1979 — 1981

Turn around time ☐ Priority 1 or Standard ☐ Priority 2 or 50% * ☐ Priority 3 or 100% * ☐ Priority 4 ERS (Dallas Only) * Must Coordinate with Project Manager

Shipment For Case Complete ☐ Yes ☒ No

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
Anthony Mubiru	11/20/97	1900			

Remarks: *Preserve Sulfide Samples in lab. *Sample W-7 is the MS/MSD

Client's delivery of samples constitutes acceptance of ITS Environmental Laboratories terms and conditions contained in the Price Schedule.

[1] Matrix: WW - Wastewater W - Water S - Soil SD - Solid L - Liquid A - Air Bag C - Charcoal tube SL - Sludge O - Oil

[2] Container: VOA - 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O - Plastic or other

ITS cannot accept verbal changes. Please Fax written changes to (972) 238-5592

ITS Environmental Laboratories 1089 East Collins Blvd., #100 Richardson, TX 75081 (972) 238-5591

CHAIN OF CUSTODY RECORD

Report to:
Company: TechLaw
Address: 10 South Wacker
Suite 2100
Chicago, IL 60606
Contact: Rob Young
Phone: 312 345 8966
Fax: 312 578 8904
Contract/Quote #:

Invoice to
Company: TechLaw
Address: 10 South Wacker Dr
Suite 2100
Chicago, IL 60606
Contact: Rob Young
Phone: 312 345 8966
PO/SO #: R05020

ANALYSIS REQUESTED

Lab use
Due Da

Temp. of coolers when received (C°): 1 2 3 4 5
Custody Seal N / Y
Intact N / Y
Screened For Radioactivity

Sampler's Name: Rob Young
Sampler's Signature:

Proj. No.: R05020
Project Name: KMA
No./Type of Containers[2]: 1 each

Matrix[1]	Date	Time	Comp	Grab	Identifying Marks of Sample(s)	VOA	A/G 1 Lt.	250 ml	P/O	Titanium	Appendix IX Metals	Sulfide	Nitrite/Nitrate	PCBs						Lab Sample ID (Lab Use Only)
W	11/19/97	1110	~~X~~	X	SW-1				X	X	X									1881
W	11/19/97	1000		X	SW-2				X	X	X									1812
W	11/19/97	1110		X	SW-1				X			X								1880
W	11/19/97	1000		X	SW-2				X			X								1811
W	11/19/97	1630		X	GW-2				X			X	X							1937
W	11/19/97	1545		X	GW-1				X			X	X							1933
W	11/19/97	1545		X	GW-1				X	X	X									1932
W	11/19/97	1630		X	GW-2				X	X	X									1938
W	11/19/97	1545		X	GW-1		X		~~X~~					X						1931
W	11/19/97	1630		X	GW-2		X							X						1936

Turn around time ☐ Priority 1 or Standard ☐ Priority 2 or 50% * ☐ Priority 3 or 100% * ☐ Priority 4 ERS (Dallas Only) * Must Coordinate with Project Manager

Shipment For Case Complete ☐ Yes ☒ No

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
[signature]	11/20/97	1900			
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:

Remarks
PRESERVE SULFIDE SAMPLES IN LAB

PAGE 1 OF 2

Client's delivery of samples constitutes acceptance of ITS Environmental Laboratories terms and conditions contained in the Price Schedule.

[1] Matrix WW - Wastewater W - Water S - Soil SD - Solid L - Liquid A - Air Bag C - Charcoal tube SL - Sludge O - Oil

[2] Container VOA - 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O - Plastic or other

ITS cannot accept verbal changes. Please Fax written changes to (972) 238-5592

ITS Environmental Laboratories 1089 East Collins Blvd., #100 Richardson, TX 75081 (972) 238-5591

CHAIN OF CUSTODY RECORD

Report to:
Company: TechLaw
Address: 10 South Wacker Dr
Suite 2100
Chicago, IL 60606
Contact: Rob Young
Phone: 312 345 8966
Fax: 312 578 8904
Contract/Quote #:

Invoice to
Company: TechLaw, Inc.
Address: 10 South Wacker Dr
Suite 2100
Chicago, IL 60606
Contact: Rob Young
Phone: 312 345 8966
PO/SO #: R05020

ANALYSIS REQUESTED: SVOCs

Lab use
Due Date

Temp. of coolers when received (C°): 1 | 2 | 3 | 4 | 5

Custody Seal N / Y
Intact N / Y
Screened For Radioactivity

Sampler's Name: Rob Young
Sampler's Signature: [signature]

Proj. No.: R05020
Project Name: RMA
No./Type of Containers[2]: 2 each

Matrix[1]	Date	Time	Comp	Grab	Identifying Marks of Sample(s)	VOA	A/G 1 Lt.	250 ml	P/O	SVOCs	Lab Sample ID (Lab Use Only)
W	11/19/97	1545		X	GW-1		X			X	1929, 1930
W	11/19/97	1630		X	GW-2		X			X	1935, 1934

Turn around time ☐ Priority 1 or Standard ☐ Priority 2 or 50% * ☐ Priority 3 or 100% * ☐ Priority 4 ERS (Dallas Only) * Must Coordinate with Project Manager

Shipment For Case Complete ☐ Yes ☐ No

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
[signature]	11/20/97	1900			

Remarks
~~PRESERVE SULFIDE~~ RY 11/20/97

PAGE 2 of 2

Client's delivery of samples constitutes acceptance of ITS Environmental Laboratories terms and conditions contained in the Price Schedule.

[1] Matrix WW - Wastewater W - Water S - Soil SD - Solid L - Liquid A - Air Bag C - Charcoal tube SL - Sludge O - Oil

[2] Container VOA - 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O - Plastic or other

ITS cannot accept verbal changes. Please Fax written changes to (972) 238-5592

T Shaw, Inc.
~~A.T. KEARNEY~~

A.T. Kearney Inc.
222 West Adams
Chicago, IL 60606
312/648-0111

Chain of Custody Record

11064

Project Code	Samples Shipped To	Samplers Names	1) Sample description (Enter in column A)	2) Preservatives (Enter in column B)
R05020	Inchcape Testing Services, 1089 E. Collins Blvd, Richardson, TX	Anthony Mubiru, Todd Quillen, Rob Young	1. Surface Water	1. HC1
Project (site) Name: RMA			2. Ground Water	2. HNO_3
			3. Leachate	3. Na HSO_4
City, State, Zip Code: Manistique, MI	Carrier: FEDEX	Samplers Signatures: Todd W. Quillen; Todd Quillen for R. Young	4. Rinsate	4. H_2SO_4
			5. Soil/Sediment	5. Na OH
Date Shipped: 11/21/97	Air Bill Number: 801817765697		6. Oil	6. Other (specify)
			7. Waste	7. Ice only
			8. Other (specify)	N. Not preserved

Sample Identification Numbers	A. Matrix enter from Box 1	B. Preser. enter from Box 2	Grab or Comp	Number of Sample Containers	MM/DD/YY Time sample collection	Analysis VOCs									Remarks/ Tag Numbers
GW-1	2	1	G	3	11/18/97, 15:25	✓									1926-1928
SW-2	~~2~~ 1 KRH	1	G	3	11/19/97, 10:00	✓									1820-1822
TB-2	8-DI water	1	G	2	Lab	✓									Tr. Blank 1740, 1741
SW-1	~~2~~ 1 KRH	1	G	3	11/19/97, 1110	✓									1817-1819
SW-2	1	1	G	3	11/19/97, 1630	✓									1739, 1742, 1743

KRH 11/21/97

Relinquished By	Time	Date	Received By	Time	Date	Received By	Time	Date	Received By	Time	Date
Todd W. Quillen	1300	11/21/97									
Relinquished By	Time	Date	Received By	Time	Date	Received By	Time	Date	Received By	Time	Date

Remarks

Split Samples — Accepted — Declined (Signature)

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A.T. Kearney 1/3907/1 TR

ENFORCEMENT SENSITIVE.

TECHLAW INC.

10 SOUTH WACKER DRIVE, SUITE 2100, CHICAGO, IL 60606
PHONE: (312) 578-8900
FAX: (312) 578-8904

RZ2.R05020.01.ID.163

November 12, 1997

Mr. Brian Freeman
U.S. Environmental Protection Agency
Region 5 DRE-9J
77 West Jackson Boulevard
Chicago, IL 60604

Reference: EPA Contract No. 68-W4-0006; Work Assignment No. R05020; Manistique Papers, Inc.; Schoolcroft, MI; EPA ID No. MID981192628; Site-Specific Field Sampling and Analysis Plan; Task 05 Deliverable

Dear Mr. Freeman:

Please find enclosed TechLaw's Site-Specific Field Sampling and Analysis Plan (SAP) for sampling activities proposed at the Manistique Papers, Inc. (Manistique Papers) Residuals Management Area (RMA) in Hiawatha Township, Schoolcroft, Michigan. This SAP proposes the collection of waste, soil, surface water, sediment and groundwater samples necessary to assist U.S. Environmental Protection Agency (U.S. EPA) Region 5 in determining whether the waste pile at the RMA contains hazardous waste or hazardous constituents, including PCBs, and whether these hazardous constituents have potentially impacted biological receptors, including wetlands and surrounding surface water bodies.

At this point in the investigation, very little is known about the hazardous constituents present in the wastes contained in the RMA. For this reason, analytical methods that provide for the detection of the widest array of chemicals (e.g., SW-846 Methods 8260 and 8270) have been proposed. Detection limits, in a limited number of cases, may be greater than U.S. EPA Region 5 Ecological Data Quality Levels (EDQLs) for these methods. However, the data generated should be of sufficient quantity and quality to make decisions concerning potential ecological impacts.

Sampling is anticipated to begin on November 17, 1997 and continue for two to three days.

Please feel free to contact me or Mr. Robert Young, the TechLaw Technical Lead, at 312/345-8966 if you have any questions.

Sincerely,

Patricia Brown-Derocher

Patricia Brown-Derocher
Regional Manager

Enclosure

cc:	F. Norling, EPA Region 5 (w/out attachment)	C. Moeller
	D. Sharrow, EPA Region 5	R. Young
	R. Young	T. Quillen

c:\ehs\20\20id163.wpd

MANISTIQUE PAPERS, INC. - RESIDUALS MANAGEMENT AREA
EPA ID NO. MID981192628

SITE SPECIFIC SAMPLING AND ANALYSIS PLAN
WASTE, SOIL, SURFACE WATER, SEDIMENT
AND GROUNDWATER SAMPLING
TASK 05 DELIVERABLE

Submitted to:

Mr. Brian Freeman
U.S. Environmental Protection Agency
Region 5 DRE-9J
77 West Jackson Boulevard
Chicago, Illinois 60604

Submitted By:

TechLaw, Inc.
10 South Wacker Drive, Suite 2100
Chicago, Illinois 60606

EPA Work Assignment No.	**R05020**
Contract Number	**68-W4-0006**
Contractor WAM	**Patricia Brown-Derocher**
Contractor WAM Telephone No.	**312/345-8915**
EPA WAM	**Brian Freeman**
EPA WAM Telephone No.	**312/353-2720**

November 12, 1997

MANISTIQUE PAPERS, INC. - RESIDUALS MANAGEMENT AREA
EPA ID NO. MID981192628

SITE SPECIFIC SAMPLING AND ANALYSIS PLAN
WASTE, SOIL, SURFACE WATER, SEDIMENT
AND GROUNDWATER SAMPLING

The following constitutes the Site-Specific Field Sampling and Analysis Plan (SAP) for the waste, soil, surface water, sediment and groundwater sampling to be performed at the Manistique Papers, Inc. (Manistique Paper) Residuals Management Area (RMA) in Hiawatha Township, Schoolcraft, Michigan. The sampling activities will be initiated on November 17, 1997 and are expected to continue for two to three days. Sampling in the waste pile, the area surrounding the waste pile and in Gould's Slough Creek will take place using two, two-person sampling teams. The schedule outlined in this SAP may change due to the inherent variables (e.g., weather, equipment related delays) of field sampling work.

This SAP will be used in conjunction with TechLaw's (formerly A.T. Kearney's) U.S. Environmental Protection Agency (U.S. EPA)-approved Region 5 Generic Quality Assurance Project Plan (QAPP) for Sampling Operations, dated January 1995. TechLaw has selected Intertek Testing Services (ITS) in Richardson, Texas to perform the analyses required under this SAP. ITS is a TechLaw Team subcontractor.

Purpose and Objective

This SAP has been prepared to allow for the collection and analysis of waste, soil, surface water, sediment and groundwater samples from the RMA. The samples will be collected to assist U.S. EPA Region 5 in determining whether the waste pile at the RMA contains hazardous waste or hazardous constituents, including polychlorinated biphenyls (PCBs), and whether these hazardous constituents have potentially impacted biological receptors, including wetlands and surrounding surface water bodies. Attachments 1 and 2 to this SAP present information which identifies the number of samples, sampling intervals, field and laboratory parameters, analytical methods, recommended sample containers, matrices, holding times, and preservatives for this sampling activity.

Background Information

Manistique Paper generates residuals during their milling process which uses recycled paper and various additives to make a variety of paper products. Since 1973, Manistique Papers has disposed of mill process residuals in their RMA which is located about 1 ½ miles north of the City of Manistique. Of the 480 acres that are owned by Manistique Papers in the area surrounding the RMA, 230 acres are considered, by Manistique Papers, as suitable for the disposal of plant residuals. Approximately 45 acres of this 230 acres is considered under active use according to a January 1988 Hydrogeological Study (submitted by Bittner Engineering, Inc.). Residuals are transported by truck to the RMA and dumped onto the waste pile. The waste pile is unlined, unengineered, and operated as an above ground site. Based on 1997 aerial photography, the approximate dimensions of the RMA waste pile are 1,100 feet by 1,400 feet. A site map of the RMA is included as Figure 1.

The residuals disposed of at the RMA are reportedly dewatered wastewater treatment plant sludges predominantly consisting of unusable paper fibers and clay (89% of the waste disposed at the RMA) and fly ash and bottom ash from the boilers at the mill (10%). Miscellaneous wood and paper wastes such as pallets, shipping material and bales of waste paper are also disposed in the waste pile (<1%). Historical documents report that empty 55-gallon drums may have been disposed in the RMA waste pile. A June 17, 1986 Michigan Department of Natural Resources (MDNR) memorandum states that mill sludges containing high levels of PCBs from the mill's de-inking lagoon were disposed of in a dumping area identified as the Manistique Pulp and Paper Dump in Hiawatha Township.

The topography surrounding the RMA is generally flat. Based on available file materials, the thickness of the waste pile is estimated to range from about 20 feet in the south to 50 feet in the north. Standing water was observed adjacent to the waste pile in photographs and well completion information from the eight groundwater monitoring wells located at the RMA indicate that groundwater occurs at approximately 12 feet below ground surface (bgs). The estimated groundwater flow direction across the RMA site is northeast at a rate of approximately 55 feet/year based on aquifer parameters discussed in the January 1988 Hydrogeological Study. Gould's Slough Creek and it's associated wetland are located 900 feet northeast of the waste pile (see Figure 1). The subsurface geology at the RMA is generally described in the available file materials as sand overlying fractured, crystalline limestone which occurs at a depth of 5 to 20 feet bgs.

Waste and Soil Sampling

A geoprobe which uses a hammer type driving mechanism will be used to collect up to 12 waste samples from the waste pile. These samples will be collected from four, or potentially six, geoprobe borings. Initially, three of the borings (B-1 through B-3) will be located in the southern half of the waste pile since this appears to be the area which most likely received waste during the 1970's, when it is suspected that PCB-containing sludges may have been dumped onto the waste pile. This supposition is based on the apparent current practice of dumping wastes to the east, north and west of the south portion of the waste pile. A fourth geoprobe boring (B-4) will be installed in the center of the northern portion of the waste pile to characterize waste dumped in that area.

Even though it is likely that if PCB containing sludges were dumped into the waste pile, they would have been dumped in the southern portion, waste dumped in the northern portion of the waste pile may also contain hazardous constituents. For example, hazardous constituents may have been released from 55 gallon drums, or from the fly/bottom ash that is disposed in the waste pile. If visual observations or screening methods at boring location B-4 indicate the potential for hazardous constituents to exist in the northern portion of the waste pile, two additional borings (B-5 and B-6) may be installed in the northern area. The proposed waste pile sampling locations are shown in Figure 2.

The borings in the southern portion of the waste pile (B-1 through B-3) will be continuously sampled to the underlying soil surface, or until geoprobe refusal. Boring(s) in the northern portion of the pile (B-4, and potentially B-5 and B-6) will be continuously sampled after a depth of approximately 10 feet is reached. Up to two waste samples will be collected from each boring depending on the thickness of the waste pile at each boring location, the results of screening techniques to be applied at each boring and visual observations of waste material.

Two screening methods will be used to establish sampling depths and parameters for laboratory analysis. An immunoassay screening method will be used to identify relative levels of PCBs in waste samples. The PCB immunoassay technique involves mixing a soil or waste sample with various liquids and comparing the resultant color change to that of a reference solution following the manufacturers instructions. Approximately four waste samples from the initial two borings (B-1 and B-2) will be screened using the immunoassay method, with sample collection biased toward waste materials resembling oily mill sludges. The results of the PCB immunoassay screening method will assist in the identification of samples to be analyzed for PCB analysis.

The physical description of the waste samples will also be logged for each boring, and the physical characteristics of samples showing high and low PCB concentrations in the immunoassay tests will be noted. These physical characteristics (e.g., color, grain size, presence/absence of oil/moisture, smell, etc.) will then be used to select samples for PCB analysis at the laboratory, for the sampling locations where immunoassay screening will not take place.

Waste material from the geoprobe borings will also be screened with a photoionization detector (PID), following the procedures detailed in the TechLaw Region 5 Generic QAPP, to aid in identifying samples to be analyzed for Volatile Organic Compounds (VOCs).

Up to two waste samples will be collected from borings B-1 through B-4. The sample intervals will be selected for laboratory analysis using immunoassay and visual criteria for PCBs analysis. Separate aliquots/containers will be collected for immunoassay and potential laboratory analysis at the same interval, and the sample from the interval showing the highest concentration of PCBs in the immunoassay screening at B-1 and B-2 will be submitted to the laboratory for PCB analysis (one from each boring). One additional sample from each of the remaining borings (B-3 and B-4, and B-5/B-6 if required) will be selected for laboratory PCB analysis, based on visual observations (as the observations relate to the immunoassay sampling).

One sample from each boring will also be submitted to the laboratory for VOCs and Semivolatile Organic Compounds (SVOCs) analysis. The sample interval showing a high PID reading will be submitted to the laboratory for VOCs and SVOCs analysis (one sample from each boring). Therefore, the PCB samples may be collected from different sample depths than the VOC/SVOC samples.

Separate samples for total Appendix IX metals (plus titanium) and sulfide analysis by the laboratory will be collected from the each of the PCB and VOC/SVOC sampling locations. Waste material from four sampling intervals (at four different borings) will also be submitted to the laboratory for TCLP metals analysis. These samples will be collected based on visual observations and PID/immunoassay screening results, which will help determine areas of potentially high hazardous constituent levels.

If the soil beneath the southern portion of the waste pile is reached during the installation of borings B-1, B-2 or B-3, a maximum of two soil samples will be collected for laboratory analysis. The selection of soils to be analyzed by the laboratory will be based on screening and visual observations of waste materials within the boring and on visual observations and PID screening at the waste/soil interface. The samples will be analyzed in the laboratory for VOCs, SVOCs, PCBs and total Appendix IX metals (plus titanium).

Four soil samples (S-1 through S-4) will initially be collected in areas adjacent to the waste pile, where impacts due to surface runoff may have occurred. These soil samples will be collected, after clearing away plant debris and/or waste pile residuals, from the ground surface to six inches bgs. The samples will be analyzed using the immunoassay screening method to identify relative levels of PCBs, using the previously described sampling and field analytical methods. The two sample locations showing the highest concentrations of PCBs will be resampled, with additional sample volumes collected for laboratory analysis of SVOCs, PCBs and total Appendix IX metals (plus titanium).

A summary of wastes and soil sample locations, numbers and field/analytical parameters is presented in Attachment 1. Proposed analytical methods for the waste and soil samples are presented in Attachment 2. The waste and soil samples will be packaged and shipped to ITS laboratories in Richardson, Texas, in accordance with the shipping and custody procedure outlined in the TechLaw Region 5 Generic QAPP.

Surface Water and Sediment Sampling

Surface water and co-located sediment samples will be collected from four sampling locations in Gould's Slough Creek. The sampling stations will be approximately 800 feet to 1,000 feet apart along the trace of the creek (see Figure 2). This spacing will allow for the first sampling station (SW-1/Sed-1) to be located approximately 800 feet to 1,000 feet west of the main trace of the Manistique River, the second sampling station (SW-2/Sed-2) to be located in the creek near the eastern portion of the Gould's Slough wetlands, the third sampling station (SW-3/Sed-3) to be located in the western portion of the Gould's Slough wetlands and the fourth sampling station (SW-4/Sed-4) to be located upstream of that portion of Gould's Slough believed, based on available groundwater flow information, to be unaffected by the waste pile. The samples will be collected starting at the downstream location, working upstream to avoid potential disturbance between samples.

Based on the observation of standing water adjacent to the waste pile, the flat topography across the RMA and the presence of wetlands adjacent to Gould's Slough Creek, four surface water and co-located sediment samples (SW-5/Sed-5 through SW-8/Sed-8) will also be collected from wetlands and/or surface water courses (ditches, swales, etc.) near the waste pile and between the waste pile and Gould's Slough Creek. The location of these co-located surface water and sediment samples will be determined by the TechLaw sampling team in the field. The sampling team will include an ecologist, who will identify locations where potential ecological impacts may be greatest. Potential sampling stations are shown on Figure 2.

If easily accessible, surface water samples will be collected by submerging the sample containers directly into the surface water. Those areas only accessible from a distance will be sampled using a pre-cleaned beaker attached to an extendable aluminum pole. Sediment samples will be collected in one of three ways:

- if the sediments are readily accessible and not covered by more than six inches of surface water, the sediments will be collected using a pre-cleaned stainless steel trowel or spoon to transfer the sediment material directly into the sample container;

- if the sediments are covered by more than approximately six inches of surface water, a hand auger may be used to collect the sample; or

- if the sediments are covered by more than approximately six inches of surface water, a PVC pipe with a vacuum pump may be used to collect the sample.

The sampling device to be employed will be dependent on the field conditions (e.g., grain size, depth of water, sediment compactness, etc.) at the time of sampling.

Surface water samples will be analyzed for VOCs, total Appendix IX metals (plus titanium) and sulfide. The VOCs may be present due to potentially contaminated groundwater flow into the surface water bodies. Sediment samples will be analyzed for PCBs, SVOCs and total Appendix IX metals (plus titanium), since these constituents would more likely be bound to sediments than in solution.

A summary of surface wastes and sediment sample locations, numbers and field/analytical parameters is presented in Attachment 1. Proposed analytical methods are presented in Attachment 2. The surface water and sediment samples will be packaged and shipped to ITS laboratories in Richardson, Texas, in accordance with the shipping and custody procedure outlined in the TechLaw Region 5 Generic QAPP.

<u>Groundwater Sampling</u>

Groundwater samples will be collected from existing monitoring wells at the RMA. Available site maps and the 1988 Hydrogeological Study indicate that seven (and possibly eight) groundwater monitoring wells are present at the RMA. The condition of these monitoring wells is unknown at the present time. Nevertheless, four of the monitoring wells appear to be placed in appropriate locations for sampling during this site characterization sampling event. Based on groundwater flow estimates presented in the available file materials, monitoring well W-4 is in an apparent upgradient location of the RMA, and will be sampled to obtain information on background groundwater quality. File materials indicate that monitoring wells W-5, W-6 and W-8 are downgradient of the RMA, and will be sampled to determine the groundwater quality downgradient of the waste pile. Figure 2 shows the locations of these wells.

In order to verify the groundwater flow direction at the time of sampling, the TechLaw field team may attempt to perform a survey using a level. The survey will only be conducted if time permits and there are no major obstacles between wells (e.g., if one well is on an opposite side of the waste pile, or if a heavily wooded area separates several wells). The survey will be conducted using the top of the inner casing at one well as a benchmark, and all other wells will be measured relative to the benchmark well. Depth-to-groundwater measurements will also be collected on the day of the survey in order to provide an estimate of groundwater flow. The anticipated well sampling locations may be revised based upon this survey.

Monitoring wells will be purged and sampled using a pre-cleaned disposable bailer. The wells will be purged of three to five groundwater well volumes prior to sampling. Indicator parameters, including pH, specific conductivity and temperature, will be measured before purging and after each well volume is extracted.

If the existent monitoring wells are found to be damaged or otherwise not suitable for sampling, the geoprobe that will be on site for the collection of waste and soil samples may be used for collecting groundwater samples from approximately the same locations as W-4, W-5, W-6 and W-8. Since the site is in a remote, wooded location, the use of the geoprobe will be highly dependent on accessibility of potential downgradient groundwater sampling locations.

Sampling of groundwater using the geoprobe is accomplished by driving a stainless steel point sampler to a minimum depth of two feet below the water table. After the sampling depth is reached, the point of the probe is displaced and the screen exposed to the groundwater. A pre-cleaned section of polyethylene tubing is then sent down the geoprobe rods to the screen, and approximately one gallon of groundwater is purged prior to sample collection. Laboratory samples are collected by attaching a peristaltic pump to the tubing and the water is pumped to the surface. VOC samples are collected first by drawing the groundwater into the tubing, blocking the end of the tubing using rubber or polyethylene, and removing the tubing from the rods. The VOC vials are then filled from the base of the sample tubing. This eliminates the potential for degassing of the sample as it is drawn upward by the peristaltic pump. The tubing is then reconnected to the screened interval, and the remaining laboratory samples collected.

All groundwater samples will be analyzed for VOCs, SVOCs, PCBs, total Appendix IX metals (plus titanium), sulfide and nitrate-nitrite (as N). Groundwater sample analytical parameters are based on previous sampling results presented in the file materials and the anticipated characteristics of the RMA waste materials.

Proposed analytical methods are presented in Attachment 2. The groundwater samples will be packaged and shipped to ITS laboratories in Richardson, Texas, in accordance with the shipping and custody procedure outlined in the TechLaw Region 5 Generic QAPP.

Quality Control Samples

During the collection of waste, soil, surface water, sediment, and groundwater samples at the RMA, the TechLaw sampling teams will collect one field duplicate for every 10 samples, per matrix collected. In addition, equipment blanks will be collected at a frequency of one for every 10 samples, per matrix collected. Therefore, equipment blanks will be collected from the following sampling equipment: groundwater bailer; surface water sample beaker; sediment auger and/or PVC sampling pipe; and, the geoprobe split spoon. Duplicates and equipment blanks will be analyzed for the same constituents as the associated samples.

Trip blanks, consisting of analyte-free, deionized water, will be prepared by the laboratory, shipped to the sampling site, and placed in coolers and handled/shipped in the same manner as all aqueous VOC samples. The trip blanks will be analyzed in the laboratory for VOCs. One matrix spike/matrix spike duplicate (MS/MSD) sample will be collected for every 20 samples of each matrix collected. Since there will be no more than 20 samples collected for each matrix, one MS/MSD sample will be collected for each media being sampled (i.e., waste, soil/sediment, surface water and groundwater). MS/MSD samples will be analyzed for the same constituents as those in the sample matrix being analyzed.

Laboratory quality control requirements are outlined in the TechLaw Region 5 Generic QAPP and the analytical methods listed in Attachment 2.

Sample Collection, Preparation, Custody and Shipment

The samples collected by TechLaw will remain in the custody of TechLaw field personnel until relinquished for shipment to the analytical laboratory. The sample bottles will be appropriately labeled (label affixed directly on the face of the bottle) and tagged with U.S. EPA sample tags. A chain-of-custody (COC) form will accompany the samples from the point of origin to the analytical laboratory. The samples will be collected in containers specified in Section 6 of the U.S. EPA approved, TechLaw Generic QAPP. All samples will be collected in "certified-clean" sample containers obtained from ITS. All split samples will be shipped via overnight carrier in coolers to Intertek Testing Services (ITS), 1089 East Collins Blvd, Richardson, Texas, 75081, Attn: Tarri Rohne (phone 972/238-5591).

Investigation Derived Waste Management

IDW will be managed per the memorandum from Mr. Robert Young, TechLaw to Ms. Diane Sharrow, U.S. EPA Region 5. This memorandum is included as Attachment 3 to this SAP.

Analytical Requirements

The analytical and QA/QC requirements (including calibration procedures and frequencies) for the laboratory are outlined in the U.S. EPA-approved, TechLaw Generic QAPP. Analytical reporting limits are based on the method and SW-846 requirements. The analytical methods and sample container, preservation and holding time requirements are shown in Attachment 2.

Data Validation

Analytical data will be generated by the subcontractor laboratory and provided to TechLaw in conformance with CLP (like) reporting protocols. The resulting data will undergo a 100 percent data validation effort by a member of the TechLaw Team, independent of the sampling team. This validation will be in conformance with the Functional Guidelines for Organic and Inorganic Data Validation. Specific data package and data validation requirements are outlined in the U.S. EPA-approved, TechLaw Generic QAPP.

Project Schedule and Report Deliverables

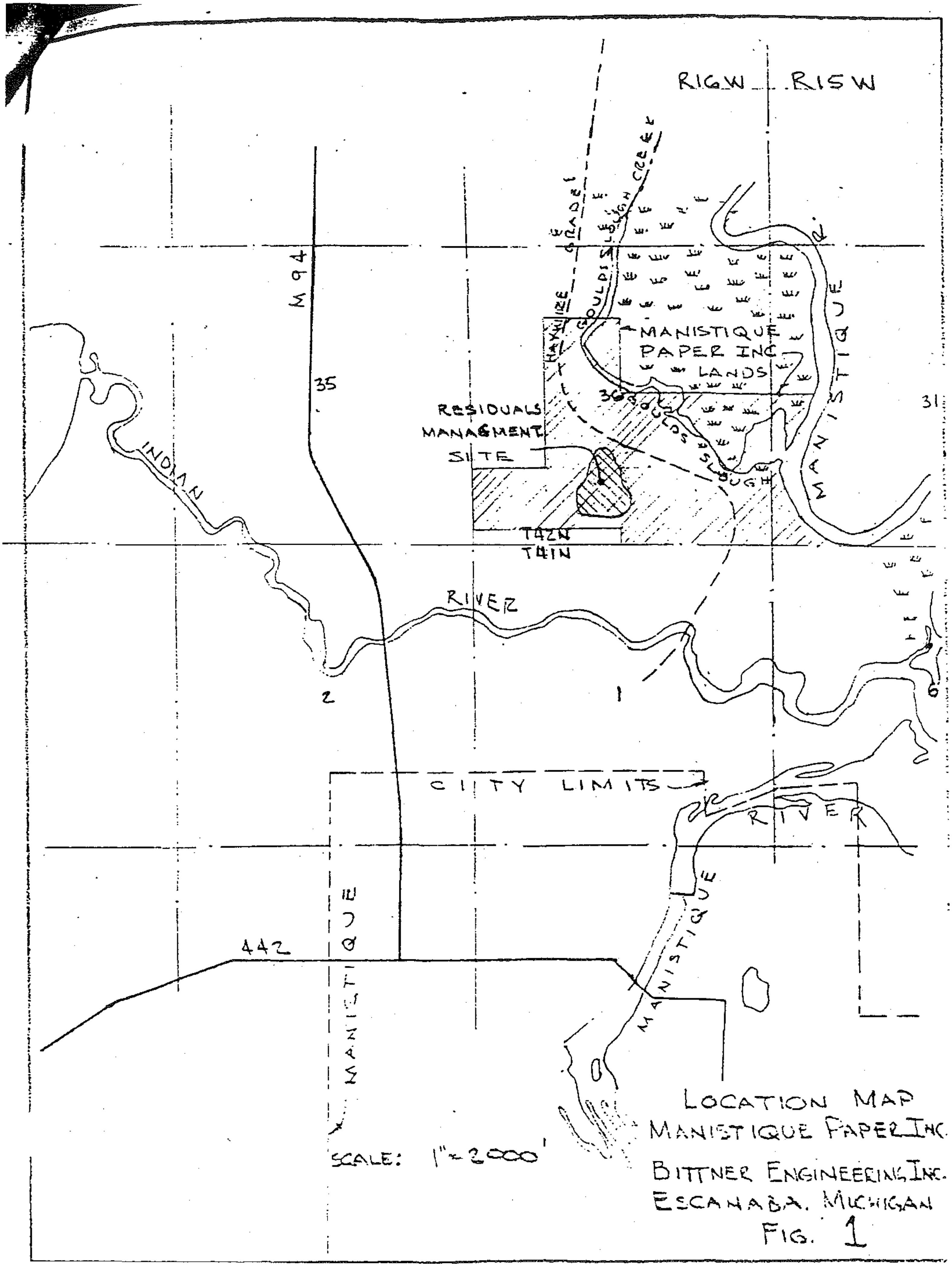
The sampling activities will be initiated on November 17, 1997 and are expected to continue for two to three days. A data validation report will be generated within 21 days of receiving the laboratory data package for the final analysis. Within 21 days of the receipt of the data validation report, a final sampling report will be prepared and submitted to the EWAM. As discussed with the EWAM, the report will include the waste, soil, surface water, sediment and groundwater analyses. This report will detail the sampling locations and techniques, any problems that were encountered and any other observations, including photographs, made during the sampling activities.

Project Organization

The EWAM for this project is Mr. Brian Freeman. The U.S. EPA technical lead is Ms. Diane Sharrow. The TechLaw WAM for this project is Ms. Patricia Brown-Derocher and the TechLaw technical lead for this project is Mr. Robert Young. TechLaw Site Safety Officer (SSO) and field sampling personnel are Mr. Rob Young (Team Leader), Mr. Todd Quillen (SSO), Mr. Jeff Raines, Mr. Mark Atanasoff and Mr. Anthony Mubiru. Mr. Young and Mr. Mubiru will primarily be responsible for the monitoring well survey and collection of surface water and sediment samples. Mr. Mubiru will also perform the immunoassay analyses. Mr. Quillen and Mr. Raines will be primarily responsible for the sampling of waste, soil and groundwater. Mr. Atanasoff is the project ecologist, whose primary responsibility is to identify potentially ecologically-sensitive areas, and assist in the collection of surface water and sediment samples. The laboratory for this project is ITS in Richardson, Texas. Data Validation will be performed by appropriately qualified members of the TechLaw Team.

FIGURE 1

SITE VICINITY MAP



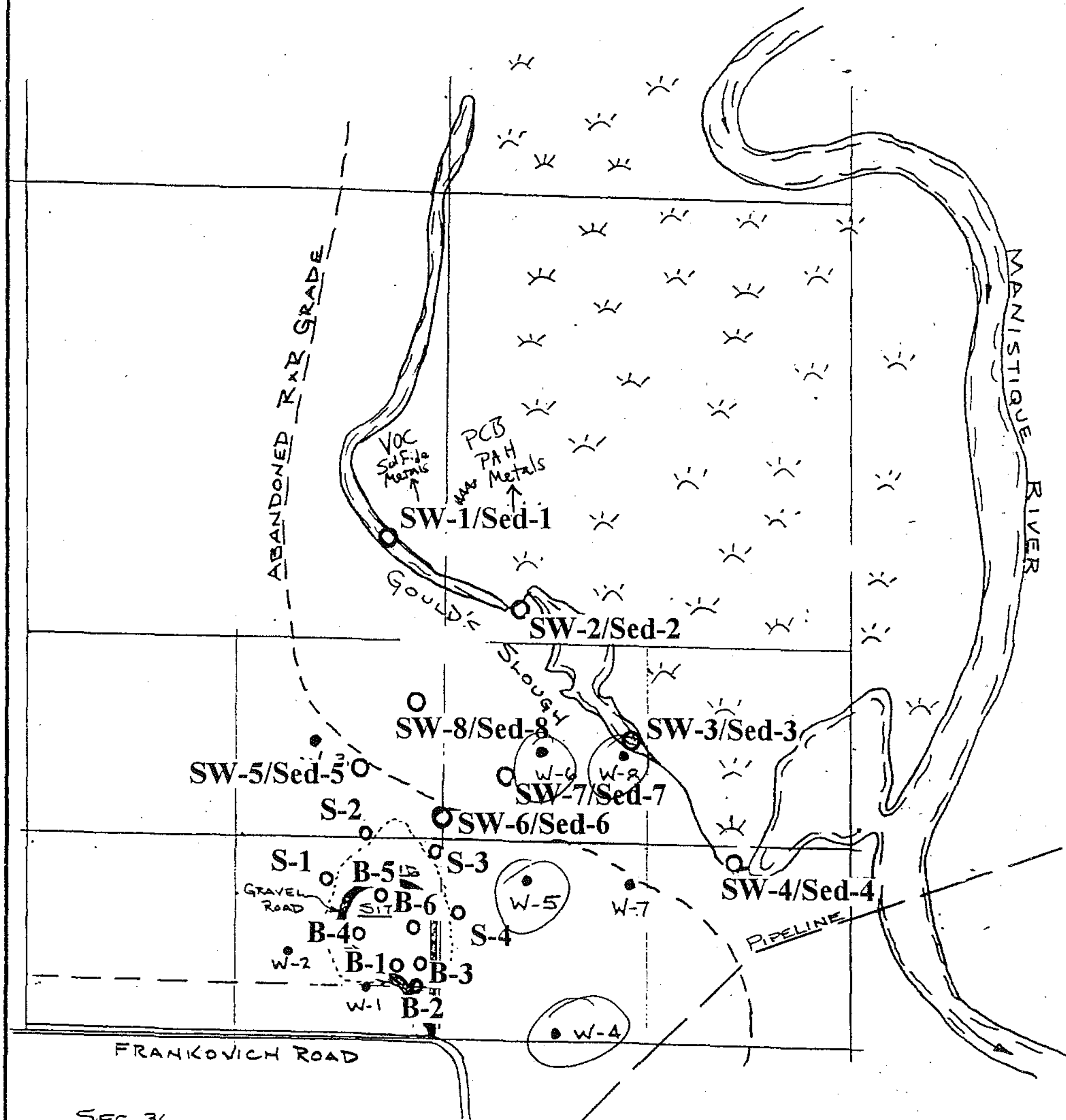
LOCATION MAP
MANISTIQUE PAPER INC.

BITTNER ENGINEERING INC.
ESCANABA, MICHIGAN

FIG. 1

FIGURE 2

SAMPLE LOCATION MAP



SEC. 36,
T42N, R16W
SCHOOLCRAFT CO, MICH.

O Approximate Sampling Location

BITTNER ENGINEERING, INC. 614 Ludington Street Escanaba, Michigan 49829		MANISTIQUE PAPER INC.	CONTRACT
SCALE 1" = 880' ±	DATE 5-2-89	MONITORING LOCATIONS	SHEET

ATTACHMENT 1

SAMPLE COLLECTION SUMMARY

ATTACHMENT 1

SAMPLE COLLECTION SUMMARY

Area	Matrix	No. of Locations	Sample Depths	Field Parameters	Analytical Parameters	Field Blanks	Field Dups.	MS/MSDs
Waste Pile	Sludge	4 - 6 Borings; 8 - 12 Samples	Based on Field Parameters	Immunoassay - PCBs PID Screening - VOCs	VOCs, SVOCs, PCBs, Total App. IX metals+Ti, Sulfide, TCLP Metals	1 - 2 (1 per 10)	1 - 2 (1 per 10)	1 (1 per 20)
Beneath Waste Pile	Soil	2	0 - 6"	Immunoassay - PCBs	VOCs, SVOCs, PCBs, Total App. IX metals+Ti	None - See Soil Adj to Waste Pile	None - See Soil Adj to Waste Pile	None - See Soil Adj to Waste Pile
Adjacent to Waste Pile	Soil	4 Field, 2 Lab Parameters	0 - 6"	None	SVOCs, PCBs, Total App. IX Metals + Ti	1 (1 per 10)	1 (1 per 10)	1 (1 per 20)
Gould's Slough	SW	4	Surface	pH, Cond., Temp	VOCs, Sulfide Total App. IX Metals + Ti	1 (1 per 10)	1 (1 per 10)	1 (1 per 20)
Gould's Slough	Sed.	4	0 - 6"	None	SVOCs, PCBs, Total App. IX Metals + Ti	1 (1 per 10)	1 (1 per 10)	1 (1 per 20)
Wetlands/SW Courses	SW	4	Surface	pH, Cond., Temp	VOCs, Sulfide Total App. IX Metals + Ti	None - See SW above	None - See SW above	None - See SW above
Wetlands/SW Courses	Sed.	4	0 - 6"	None	SVOCs, PCBs, Total App. IX Metals + Ti	None - See Seds above	None - See Seds above	None - See Seds above
Area Surrounding Waste Pile	GW	4	~ 8 - 15'	pH, Cond., Temp.	VOCs, SVOCs, PCBs, Total App. IX metals+Ti, Sulfide, Nitrate-Nitrite	1 (1 per 10)	1 (1 per 10)	1 (1 per 20)

ATTACHMENT 2

ANALYTICAL METHODS AND SAMPLE CONTAINER, PRESERVATION AND HOLDING TIME REQUIREMENTS

ATTACHMENT 2

ANALYTICAL METHODS AND SAMPLE CONTAINER, PRESERVATION AND HOLDING TIME REQUIREMENTS

Parameters	Analytical Method	Matrix	Holding Time	Container	Preservative
VOCs	SW-846 Method 8260B	Waste, Soil, Sediment	14 Days	1, 4-oz glass jar	Cool to 4^0 C
	SW-846 Method 8260B	SW, GW	14 Days	2 X 40 ml vials w/septum caps	HCL to pH<2, Cool to 4^0 C
SVOCs	Prep: SW-846 Method 3510C Anal: SW-846 Method 8270C	SW, GW	7 Days to Extraction, 40 Days to Analysis	2, 1-Liter Amber Glass	Cool to 4^0 C
	Prep: SW-846 Method 3550C Anal: SW-846 Method 8270C	Waste, Soil, Sediment	14 Days to Extraction, 40 Days to Analysis	1, 8-oz. glass jar	Cool to 4^0 C
PCBs	Prep: SW-846 Method 3510C Anal: SW-846 Method 8082	SW, GW	7 Days to Extraction, 40 Days to Analysis	1, 1-Liter Amber Glass	Cool to 4^0 C
	Prep: SW-846 Methods 3550C Anal: SW-846 Method 8082	Waste, Soil, Sediment	14 Days to Extraction, 40 Days to Analysis	1, 8-oz. glass jar	Cool to 4^0 C
App. IX Metals (plus Titanium)*	Prep: SW-846 Method 3005 Anal: SW-846 Method 6010B/7000	SW, GW	6 months	1-Liter Poly Bottle	HNO_3 to pH<2; Cool to 4^0 C
	Prep: SW-846 Method 3050 Anal: SW-846 Method 6010B/7000	Waste, Soil, Sediment	6 months	1, 8-oz. glass jar	Cool to 4^0 C

ATTACHMENT 3

INVESTIGATION-DERIVED WASTE MANAGEMENT PROCEDURES

MEMO

To: Diane Sharrow, U.S. EPA Region 5
From: Robert Young, Field Team Leader, TechLaw RY
Subject: Investigation-Derived Waste - Manistique Paper
Date: October 28, 1997

We are currently planning on conducting a field sampling investigation at the Manistique Paper Residuals Management Area (RMA) near Manistique, Michigan on November 12 and 13, 1997 (and November 14th, if needed). During the investigation, we estimate that two drums of investigation derived waste (IDW) will be generated. This includes approximately 40 gallons of monitoring well purge water and decontamination water, and approximately 10-20 gallons of a solid matrix composed of RMA sludges and soils.

We are currently considering the following three transportation/disposal companies, each of which would be able to perform removal and treatment and/or disposal of the IDW:

- Superior Environmental, Fond Du Lac and Port Washington, Wisconsin
- Hydrite Chemical, Brookfield, Wisconsin
- Dynex Environmental, St. Paul, Minnesota

As we discussed in an earlier conversation, we would like your feedback regarding whether any of these companies are not acceptable to U.S. EPA.

The proposed procedures for managing the IDW are as follows:

1. Following sampling activities, place the resultant purge water and decontamination fluids into a 55-gallon drum. Tightly affix the drum lid and retention ring on the drum to prevent leakage. Place the waste RMA sludges and soils into a separate, smaller drum and secure the lid.

2. Clearly label the 55-gallon drum: "Monitoring Well Purge Water and Decontamination Fluids" and mark the date of generation on the drum. Label the solids drum: "Drill Cuttings" and mark the date of generation on the drum.

3. Place the drums in the most secured area of the site. If there is an accessible maintenance building or garage on-site, place the drums within the building. If there is no such structure at the RMA site, then place the drums on the property, near the entrance to the RMA site, where they can be accessed by the disposal company, but can not be readily accessed or seen by potential trespassers.

4. Await analytical results for the media being sampled (we estimate this will take approximately two to three weeks for preliminary results). Laboratory analyses from the RMA sludges will be used to characterize the solids portion of the wastestream, and the results of monitoring well sampling will be used to characterize the liquid portion of the wastestream.

5. Based on the waste characterization, fill out EPA Form 8700-12 (Notification of Regulated Waste Activity) and send it to you for approval. The form will identify the Installation generating the hazardous waste as: "U.S. EPA Investigation at the Manistique Paper RMA Facility," and "U.S. EPA Region 5" as the contact for the Installation. The ownership portion of the form will read: "Manistique Paper/U.S. EPA Investigation." TechLaw will not be identified as the generator.

   All IDW will be conservatively managed and characterized as hazardous waste. The type of hazardous waste listed on Form 8700-12 will reflect the results of the laboratory analyses.

6. Once approved by Ms. Sharrow, forward EPA Form 8700-12 to Mr. Don Clingersmith or Mr. John Lefler at the Michigan Department of Environmental Quality (MDEQ). Mr. Lefler has indicated that the EPA ID Number can be issued within a few days, and the paperwork processed within a few weeks.

7. After receiving an EPA ID Number, contact the transportation/disposal company (see the list of companies presented above) and set-up a date and time for removal of the IDW drums. The transportation/disposal companies all require a copy of the analytical results (i.e., waste characterization) before they will pick-up and manage the IDW.

8. A TechLaw employee will travel to the facility on the date of IDW removal to ensure that the drums have been properly labeled, loaded and handled by the disposal company.

Please contact me at 312-345-8966 if you require modifications to any of these procedures, or would like to discuss any project-related issues in more detail.

cc: B. Freeman, EPA Region 5
P. Brown-Derocher
T. Quillen

MAN. PAPER DUMP 30

BITTNER ENGINEERING, INC.

113 SOUTH 10TH STREET, ESCANABA, MICHIGAN 49829 • 906-789-1511

xc: Scott
orig: Clif 2/2

January 31, 1995

RECEIVED
FEB 02 1995
MARQUETTE DIST. OFFICE

Mr. Jack Rydquist, P.E.
Michigan DNR
Surface Water Quality Division
1990 U.S. 41 South
Marquette, MI 49855

RE: Manistique Papers
RMA-Work Plan for Well Installation

Dear Mr. Rydquist:

In response to the concerns stated in your letter of November 14, 1994 to Mr. Leif Christensen, this letter provides our recommendations for construction of new and replacement monitoring wells at the Manistique Papers, Inc. (MPI) Residuals Management Area (RMA), along with a proposed sampling program. Upon receipt of your approval for the proposed work, MPI will arrange for the services of a well driller to construct and develop the wells. Sampling of the wells will then begin and continue as outlined herein.

EXISTING MONITORING PROGRAM

MPI has had a monitoring program in place at the RMA since June 1987. The program initially included the sampling of several observation wells constructed during 1986 in conjunction with the completion of a hydrogeological study of the RMA. During the course of numerous discussions between MPI and MDNR, the monitoring program was modified on two occasions. The first modification, which consisted of adding one monitoring well and establishing surface sampling locations on Gould's Slough and the Manistique River, was implemented in October 1989. The second modification, which consisted of expanding the parameter list to include MDNR scans 1, 2 and 8, was implemented in November 1994.

Tables 1, 2, and 3 which follow, provide a summary of the current sampling locations and parameter list which is being followed in conjunction with the quarterly sampling program at the RMA. The current monitoring plan reflects the original monitoring plan and the subsequent revisions, all approved by MDNR Waste Management Division.

RECEIVED
FEB - 6 1995
Department of Natural Resources
District 4 - Newberry

TABLE 1

LISTING OF CURRENT AND FUTURE WELL AND SURFACE WATER SAMPLING STATIONS (SEE FIGURE 1 FOR LOCATIONS)

ACTIVE WELL STATIONS*

W-1	W-4
W-2	W-6
W-3	W-7
W-8	

* As reported in our closure report of March 1, 1994 MDNR concurred in the decision to not conduct any additional sampling of MW-5 since 1987, since it is so close to the RMA and is not representative of downgradient conditions.

PROPOSED WELL STATIONS

W-1	W-7
W-2	W-8
W-3 (Reconstructed)	W-9
W-4	W-10 Bedrock Well
W-6 (Relocated)	W-11 Bedrock Well

SURFACE WATER STATIONS

G-1	Gould's Slough
R-1	Manistique River
R-2	Manistique River
R-3	Manistique River

TABLE 2

Manistique Papers, Inc.
Residual Management Area
Quarterly Sampling Program
Monitoring Wells
Parameter List

Alkalinity	4-nitrophenol
Bicarbonate	4,6-dinitro-2-methylphenol
Carbonate	Pentachlorophenol
Chemical Oxygen Demand	Bromodichloromethane
Chloride	Bromoform
Sulfate	Carbon Tetrachloride
Total Organic Carbon	Chlorobenzene
Total Phenols	Chlorodibromomethane
Static Water Level	Chloroform
pH	1,1-dichloroethane
Specific Conductance	1,2-dichloroethane
Calcium	1,1-dichloroethene
Copper	cis-1,2-dichloroethene
Iron	trans-1,2-dichloroethene
Lead	1,2-dichloropropane
Magnesium	1,3-dichloropropene
Manganese	Methylene Chloride
Sodium	1,1,2,2-Tetrachloroethane
Zinc	Tetrachloroethene
Phenol	1,1,1-trichloroethane
2-chlorophenol	1,1,2-trichloroethane
2,4-dimethylphenol	Trichloroethene
2-nitrophenol	Benzene
2,4-dichlorophenol	Ethyl Benzene
4-chloro-3-methylphenol	Toluene
2,4,5-trichlorophenol	Styrene
2,4,6-trichlorophenol	Xylene Isomers
2,4-dinitrophenol	

TABLE 3

Manistique Papers, Inc.
Residual Management Area
Quarterly Sampling Program
Surface Water Locations
Parameter List

Alkalinity	Bicarbonate
Carbonate	Chemical Oxygen Demand
Chloride	Sulfate
Total Organic Carbon	Total Phenols
pH	Specific Conductance
Calcium	Copper
Iron	Lead
Magnesium	Manganese
Sodium	Zinc

In your November 14 letter, you conveyed the Department's concern that an insufficient number of operable downgradient wells and the lack of bedrock wells make it difficult to assess the impact, if any, from the RMA. In response to your concern, we are recommending the following work and corresponding expansion of the monitoring program.

PROPOSED WELL CONSTRUCTION

Well construction will consist of reconstruction of one existing shallow well (W-3) that has been damaged, relocation of one existing well (W-6) that is incapable of producing an adequate volume of water for sampling, construction of a new downgradient shallow well (W-9) and construction of two bedrock wells (W-10 and W-11). The locations of existing and proposed wells which will be included in the monitoring plan are shown in Figure 1.

Wells will be constructed of stainless steel casing and stainless steel screens. Inside diameter of the casing will be nominal two inch. Screen length will be two feet, due to the shallow depth of the water flowing above the bedrock. Screen size will be selected based on soil grain size determined during drilling.

Bedrock wells will be completed into the Burnt Bluff formation, which appears to be the uppermost formation capable of supplying adequate amounts of groundwater. Based on a review of driller's logs for wells completed in this formation, the depth of the proposed bedrock wells will be in the range of 110 to 140 feet.

PROPOSED MONITORING PLAN

Quarterly sampling of the existing and new wells and the surface water locations will continue and testing will be performed for the parameters listed in Table 2 and Table 3. A minimum of three sets of regularly scheduled samples will be collected and analyzed prior to establishing baseline conditions in the expanded monitoring network. Sample results will be submitted to MDNR on a quarterly basis after they have been certified by the laboratory and reviewed by the engineer.

REPORT

Upon completion of the work outlined herein, a report summarizing the work will be prepared. The report will include a description of work methods, presentation of data collected during the study, an interpretation of the results obtained during the study and recommendations for further work, if necessary.

SCHEDULE

The following schedule will be adhered to in carrying out the recommended work:

February 1, 1995	Submit Work Plan to MDNR
February 20, 1995	Receive MDNR Approval for Work Plan
March 1 to March 10, 1995	Install Wells & Perform Related Field Work
March, June & September 1995	Sample Wells
November 1, 1995	Submit Report to MDNR

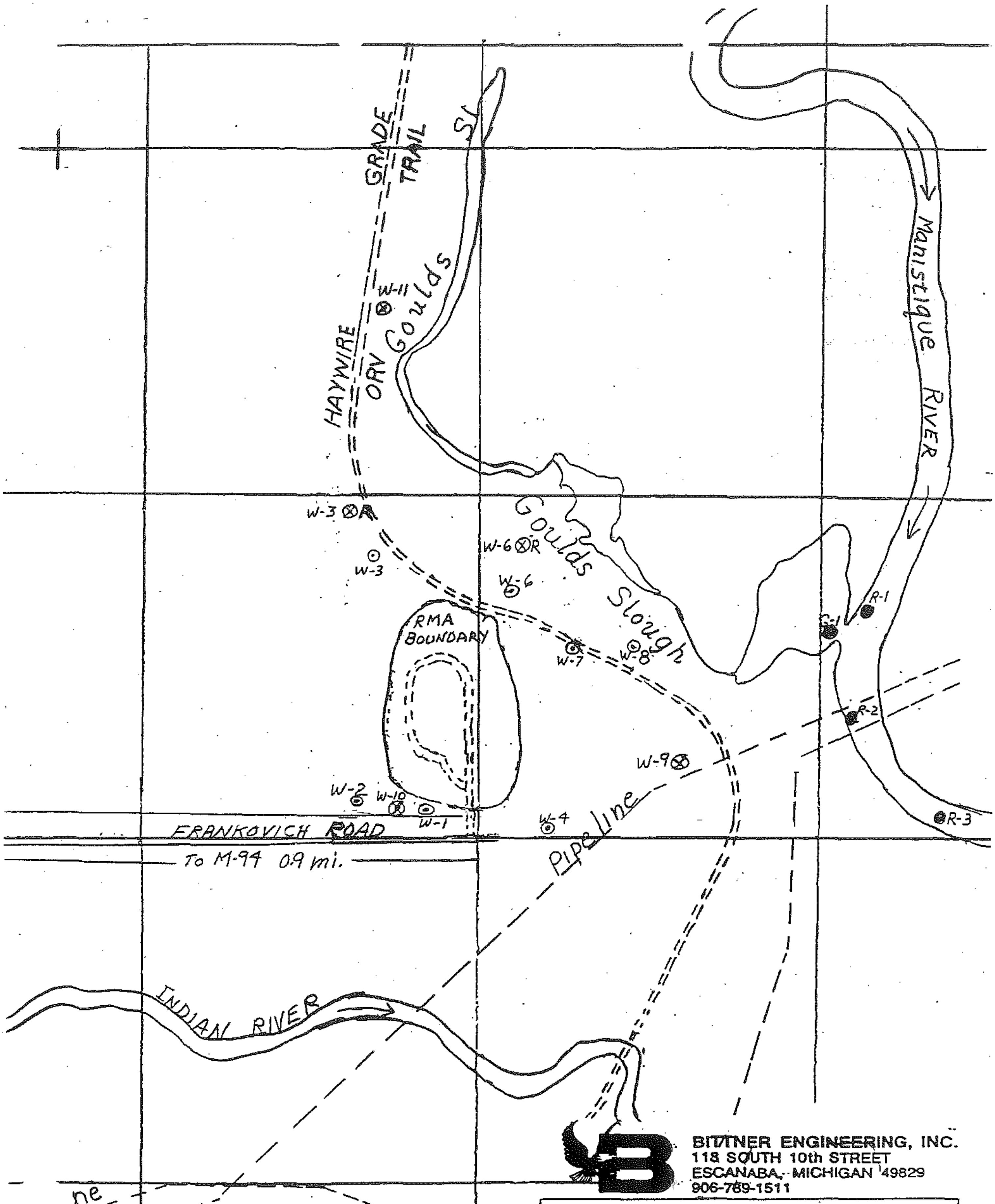
I trust that this submittal adequately addresses the concerns of your November 14, 1994 letter with respect to additional monitoring and investigation of the RMA. If you have any questions or require additional information, please do not hesitate to contact me.

Sincerely,

Dennis B. Bittner, P. E.
Project Manager

DBB/jr

cc: Bernie Ylkanen, Acting Deputy Director, MDNR
Clif Clark, MDNR
Duane Roskoskey, MDNR
Robert Schmeling, II, MDNR
Tom Arnold, MPI
Leif Christensen, MPI
Jim Cook, MPI
Jason Panek, MPI
Claudia Rast, Dickinson, Wright, Moon, VanDusen & Freeman



BITTNER ENGINEERING, INC.
118 SOUTH 10th STREET
ESCANABA, MICHIGAN 49829
906-789-1511

● -EXISTING SURFACE WATER STATIONS

⊙ -EXISTING WELLS

⊗ -PROPOSED NEW WELLS

⊗ R-PROPOSED REPLACEMENT WELL

sed on U.S.G.S. Topographic Maps

MANISTIQUE PAPERS INC.

RESIDUAL MANAGEMENT AREA

MONITORING LOCATIONS

1" = 1,000'

DBB

FIGURE No. 1

BITTNER ENGINEERING, INC.
113 SOUTH 10TH STREET, ESCANABA, MICHIGAN 49829 • 906-789-1511

August 8, 1994

AUG 11 1994

Mr. Bruce Veneberg
Area Forester
Forest Management Division
Michigan Department of Natural Resources
P.O. Box 67
Shingleton, MI 49884

RE: Manistique Papers, Inc.
Landfill Sites

Dear Mr. Veneberg:

During our meeting of July 26, 1994, we discussed the information that you would need in order to assist us with identifying State properties which could possibly be made available for siting of a new landfill to serve Manistique Papers. Specifically, it was agreed that the following information should be provided so that you could begin discussions within other divisions of the Department. These discussions would hopefully lead to the identification of suitable areas for a new landfill.

- Discussion of alternatives for long term handling of mill residuals.
- Justification for size of area required.
- List of properties (including maps), both public and private, identified as possible landfill sites.
- List of properties (including maps) currently owned by Manistique Papers available for a land exchange.

It is my understanding that you may wish to schedule another meeting, within the next two weeks, to review and discuss these materials. It is possible that representatives of other divisions may attend that meeting.

If you have any questions or require additional information, please do not hesitate to contact me. Your continued cooperation on this matter is appreciated.

Sincerely,

Dennis B. Bittner, P.E.
Project Manager

Enclosures

DBB/jr
cc: Frank Opolka, MDNR
Jack Rydquist, MDNR
Thomas Arnold, MPI
Leif Christensen, MPI
Jim Cook, MPI
Jason Panek, MPI
Claudia Rast, Dickinson, Wright

MANISTIQUE PAPERS, INC

EVALUATION OF LONG TERM RESIDUAL MANAGEMENT ALTERNATIVES

Based on an evaluation of possible alternatives, the following additional options, as the RMA continues to operate, appear to have the best potential to provide Manistique Papers with the long-term means of handling its residuals. Preliminary work/investigation has been performed already on several of these options. It is therefore possible that any one of these options, either individually or combined, could provide an environmentally sound and cost-effective means for handling Manistique Papers' residuals for many years to come.

Reuse of Manistique Papers' Residuals

The United States Department of Agriculture Soil Conservation Service ("SCS") has expressed an interest in evaluating Manistique Papers' residuals, particularly in light of their inertness and the data showing that the residuals are <u>one thousand</u> times more impermeable than current landfill cover standards and <u>ten</u> times more impermeable than current landfill liner standards. On the basis of testing conducted to date, Manistique Papers' residuals compare favorably to natural and commercial products commonly used to line Type II landfills. Discussions have progressed to the point at which Manistique Papers has executed an agreement with the SCS to conduct a feasibility study on its residuals. This study is being conducted at the Rose Lake Plant Research Center followed by on-site pilot studies at Manistique Papers' RMA. From this study it will be possible to evaluate such uses for the residuals as : (1) cover material for landfills, such as the Schoolcraft County DPW Municipal Landfill, (2) liner materials for farm site animal manure pits, and (3) land application of the residuals for soil erosion control, soil moisture retention and/or soil structure alterations to enhance plant growth on marginal sites. It is expected that the preliminary SCS study results will be available in about two years, after which additional market feasibility studies would be conducted.

In addition to the SCS, the National Council for Air and Stream Improvement (NCASI) has conducted extensive research on the use of papermill residuals for landfill liner and cover material. These studies shown that mill residuals can perform effectively as hydraulic barriers in covering and lining landfills. Hydraulic conductivity testing of Manistique Papers' residuals that began in October 1993 shown that these residuals are ten times more impermeable than the hydraulic conductivity requirements for landfill liner (that is, 2.24 to 5.27 x 10^{-8} cm/sec as compared to the landfill liner requirement of only 1 x 10^{-7} cm/sec and the landfill cover requirement of only 1 x 10^{-5} cm/sec).

Other proposed uses for the residuals are described below:

a. Wet oxidation for heat recovery and clay recovery (Michigan Tech. study);

b. Enhancement with urea formaldehyde for structural members (Michigan Tech. study);

c. Molded products (material was sent to Michigan State University);

d. Fluidized bed reactor for heat and clay recovery (Copeland Proposal);

e. Bagging in socks for oil absorption;

f. Additive in animal feed products and as animal litter component;

g. Home gardening additives; and

h. Component in building and ceramic materials.

Disposal of Manistique Papers' Residuals in an Existing Act 641 Landfill

There are currently three privately-owned sanitary landfill facilities in the Upper Peninsula: the United Waste facility in Menominee Township outside of the City of Menominee, the K&W facility in Ontonagon and the Dafter facility in Chippewa County. Major drawbacks with using these facilities are cost and lack of available space. Travel distance to Menominee and Dafter are similar and would involve round trip travel distances of about 200 miles. This alternative, which could cost in excess of 8 million dollars per year, is not only cost prohibitive, but also not logistically feasible. These privately owned landfills are simply not designed to handle the large volume of residuals generated by Manistique Papers on a daily basis. The 450 cubic yards of residuals per day from Manistique Papers' mill represents approximately 2/3 of the total municipal solid waste from the entire Upper Peninsula. Therefore, the amount of material from Manistique Papers could shorten the life of any of the three existing private facilities in the Upper Peninsula to unacceptable levels.

Continued Operation of Manistique Papers' RMA

A necessary and viable solution during the period of time required to site, design and permit an alternative landfill to the RMA, is the continued operation of the RMA. The present useful life of the RMA is limited. During the time the RMA is operated prior to closure, Manistique Papers will operate the RMA in accordance with the sound management practices that are currently in effect and which are described in detail in Manistique Papers' Program for Effective Residuals Management (PERM). The PERM was instituted as part of Manistique Papers' National Pollutant Discharge System ("NPDES") Permit in 1985. Major provisions of the PERM include:

1. Routine monitoring of wells and nearby surface water;

2. Placement of the residuals in a fashion that minimizes nuisances from dust, odors and noise;

3. Continued research and development on re-vegetation of completed residuals placement;

4. Periodic testing of the composition and leaching potential of the residuals, and;

5. Record keeping on the mass, volume and other physical characteristics of the residuals.

JUSTIFICATION FOR SIZE AND

THE DEVELOPMENT OF A NEW RESIDUALS MANAGEMENT AREA

At current production rates, Manistique Papers, Inc. produces approximately 450 cubic yards of residuals each day or about 150,000 cubic yards per year. Although coal ash and mill solid waste are not currently placed in the RMA, approximately 75 cubic yards per week of coal ash from the power plant and another 100 cubic yards per week of mill trash should be added to the total figures in designing the capacity and useful life for any new landfill.

Any alternative that is considered should provide a suitable means for handling the residuals for a minimum of 50 years. A 50 year life is necessary due to the long and difficult process of siting and permitting landfills and in obtaining approvals for other processes. Total volume requirements for 50 years would be between 8 and 9 million cubic yards. For Manistique Papers, Inc. to continue to reinvest in the current facility and to consider possible expansion of its existing operations, it must have the assurance that adequate capacity for residuals management is available.

Assuming that the new RMA would be constructed in accordance with Act 641 requirements, a minimum of 225 acres of land would be required. Looking to the future and the possibility of a major mill expansion, which could more than double the amount of residuals, the area requirements would at least double to 450 acres. In looking for a new location, an initial area of 225 acres with an option to acquire an additional 225 acres would be desirable. This large land area requirement and the stringent Act 641 standards severely limit the number of suitable areas within a reasonable trucking distance of the mill. A review of property ownership maps shows that most of the suitable areas within 10 miles of the mill are in either state or federal ownership.

PROPERTIES OWNED BY MANISTIQUE PAPERS, INC.

AND AVAILABLE FOR LAND EXCHANGE

Current inventory of property available outside the present residual management area consist of the following holdings in the Upper Peninsula of Michigan.

A. SCHOOLCRAFT COUNTY

1. SE 1/4 NW 1/4 Sec. 36, T 42N., - R..16 W. - 40 acres - Haywire ORV Trail - Gould's Slough. Plat Book page 19.

2. A portion of the NE 1/4 SW 1/4 Sec. 36, T.42N., - R.16W. - about 10 acres northeast of Haywire ORV Trail. Plat Book page 19.

3. SW 1/4 SW 1/4 Sec. 36, T. 42N., - R. 16 W. - about 30 acres - West of current residual management area. Plat Book page 19.

4. SE 1/4 Sec. 36, T.42 N., - R. 16 W. about 150 acres. - Four 40 acre tracts less about 10 acres on east edge for current RMA. Plat Book page 19.

5. E 1/4 SW 1/4 Sec 36, R. 42N., - R 15 W. About 10 acres - Full length of tract abuts Manistique River. Mouth of Gould Slough. Plat Book page 21.

6. NE 1/4 NE 1/4 Sec. 1, T. 41 N., - R. 16 W. 40 acres abuts State property on Indian River. Plat Book page 15.

7. NW 1/4 NW 1/4 Sec 6, T. 41 N., - R..15 W. 40 acres - NE corner touches Manistique River. Plat Book page 16.

8. SW 1/4 NW 1/4 Sec. 6, T.41 N., - R. 15W. 40 acres - bordered on the south by Indian River. Plat Book page 16.

9. SE 1/4 NW 1/4 Sec. 15, T. 41 N., - R. 16 W. - 40 acres - Isolated by State of Michigan property. Plat Book page 15.

10. E 1/4 NE 1/4 NE 1/4 Sec. 14, T. 43N., - R. 13 W. - 10 acres. Plat Book page 30.

B. LUCE COUNTY

1. NW 1/4 SE 1/4 Sec. 12, T. 45N., - R 9.W. - 40 acres. Plat Book Page 13.

C. MACKINAC COUNTY

1. N 1/2 NE 1/4 Sec. 3, T. 43 N., - R 11 W. - 80 acres - Plat Book Page 7.

2. N 1/2 N 1/2 Sec 2, T. 43 N. - R 11 W. - 160 acres - Plat Book Page 7.

3. SE 1/4 NW 1/4 Sec 2, T. 43N. - R 11 W. - 40 acres - Plat Book Page 7.

4. SW 1/4 NE 1/4 Sec. 2, T. 43 N., R. 11 W. - 40 acres - Plat Book Page 7.

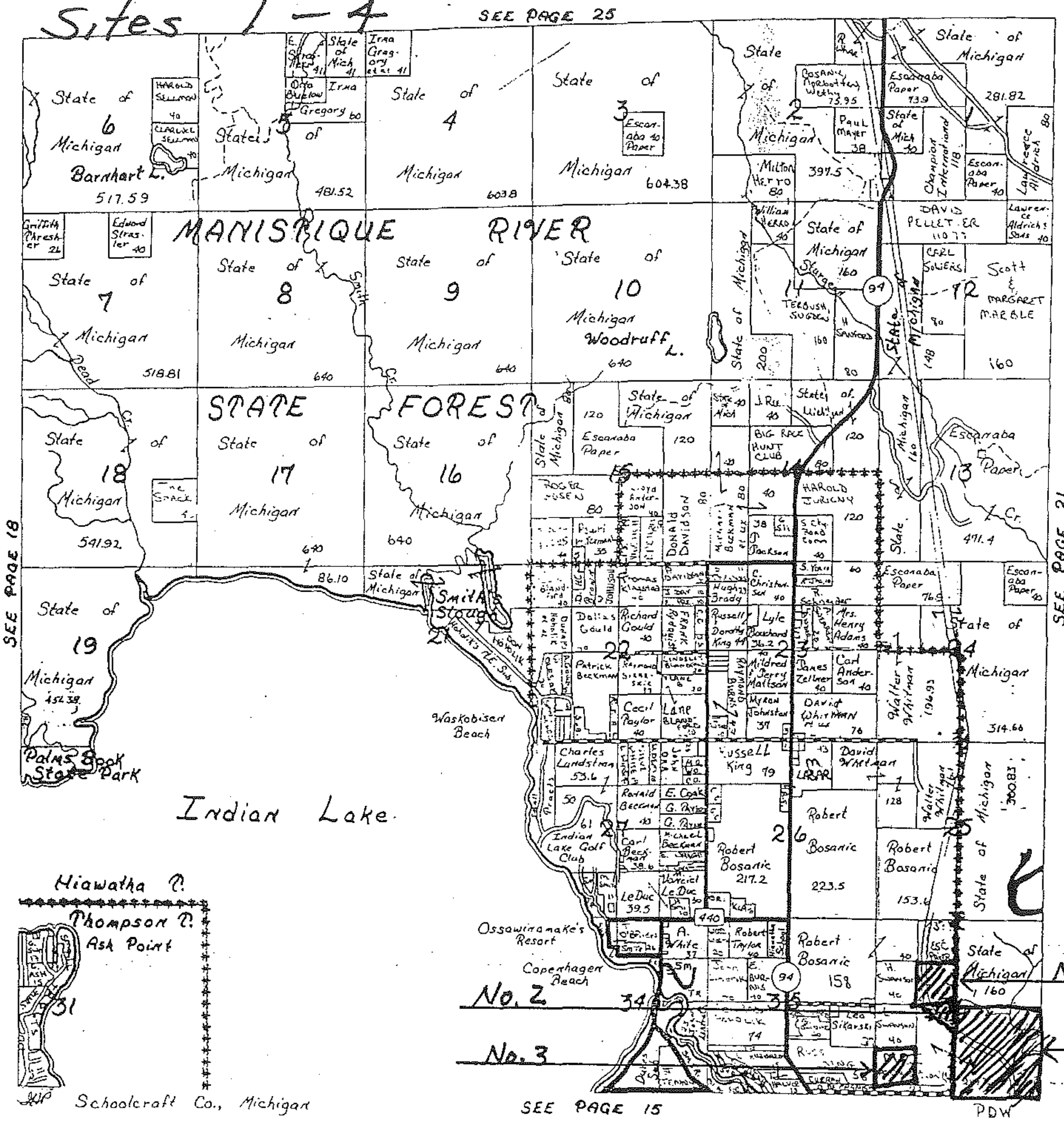
5. N 1/2 NE 1/4 Sec. 1, T. 43 N., R. 11 W. - 80 acres - Plat Book Page 7.

Total Acreage Available - Approximately 850 Acres

Schoolcraft Co.

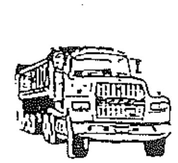
PART OF HIAWATHA PART OF THOMPSON T.42 N.-R.16 W.

Sites 1 – 4



AL'S SAND & GRAVEL

Allen Desjarden



MASON SAND (10)
PIT RUN GRAVEL (14)
LARGE STONE (11)
MANURE (6)

(11) CEMENT SAND
(9) FILL DIRT
(12) SEPTIC STONE
(8) TOP SOIL

(14) CRUSHED GRAVEL PIT RUN

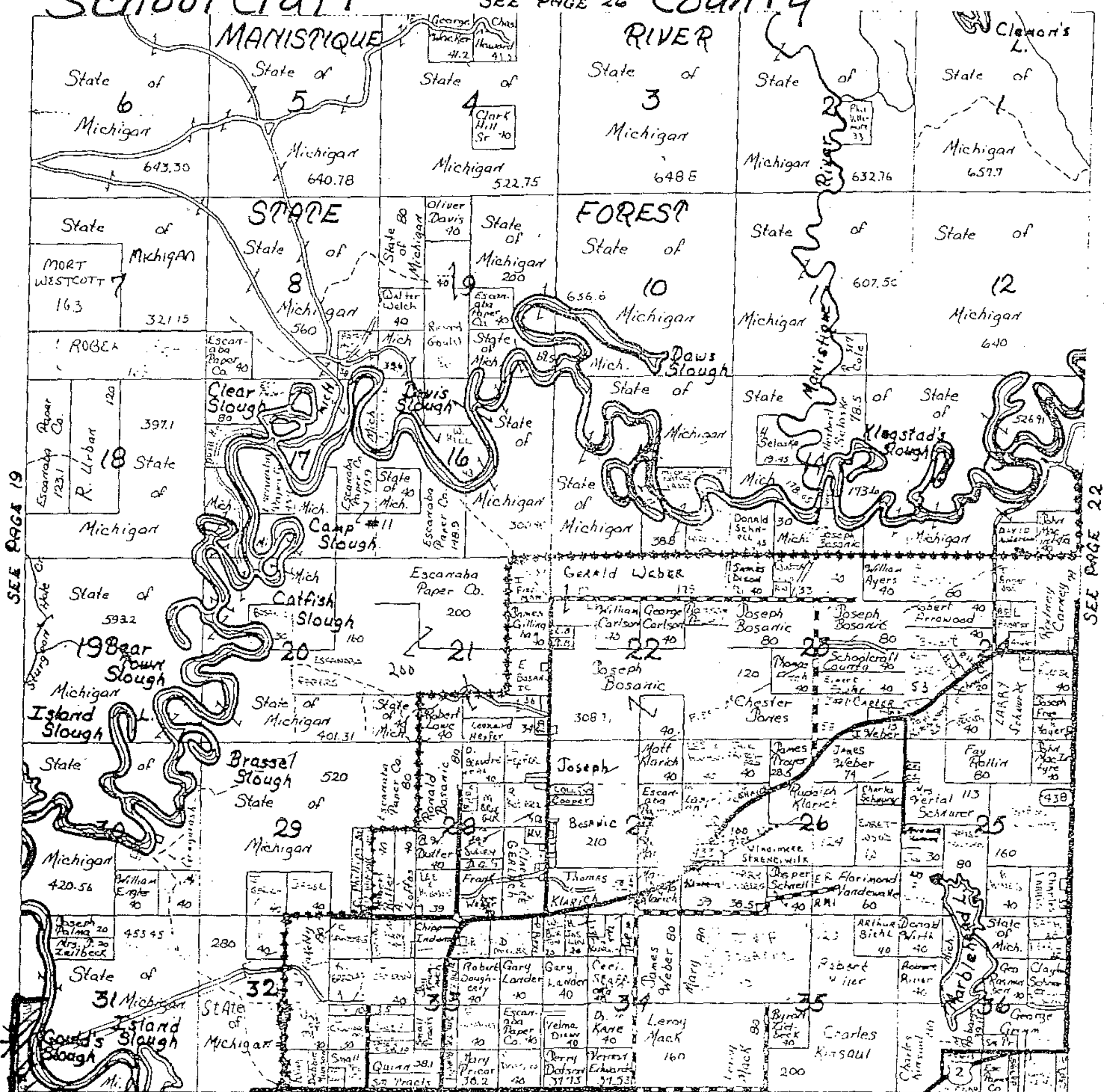
Rte. 1, Box 1371
Manistique, Michigan 49854

**LOCATED: At Marblehead Pit on East US-2,

SOUTH CENTRAL PART MANISTIQUE T. 42 N.-R. 15 W.

Schoolcraft County

SEE PAGE 26



Schoolcraft Co., Michigan SEE PAGE 16

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Schoolcraft County Treasurer
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Manistique, Michigan 49854
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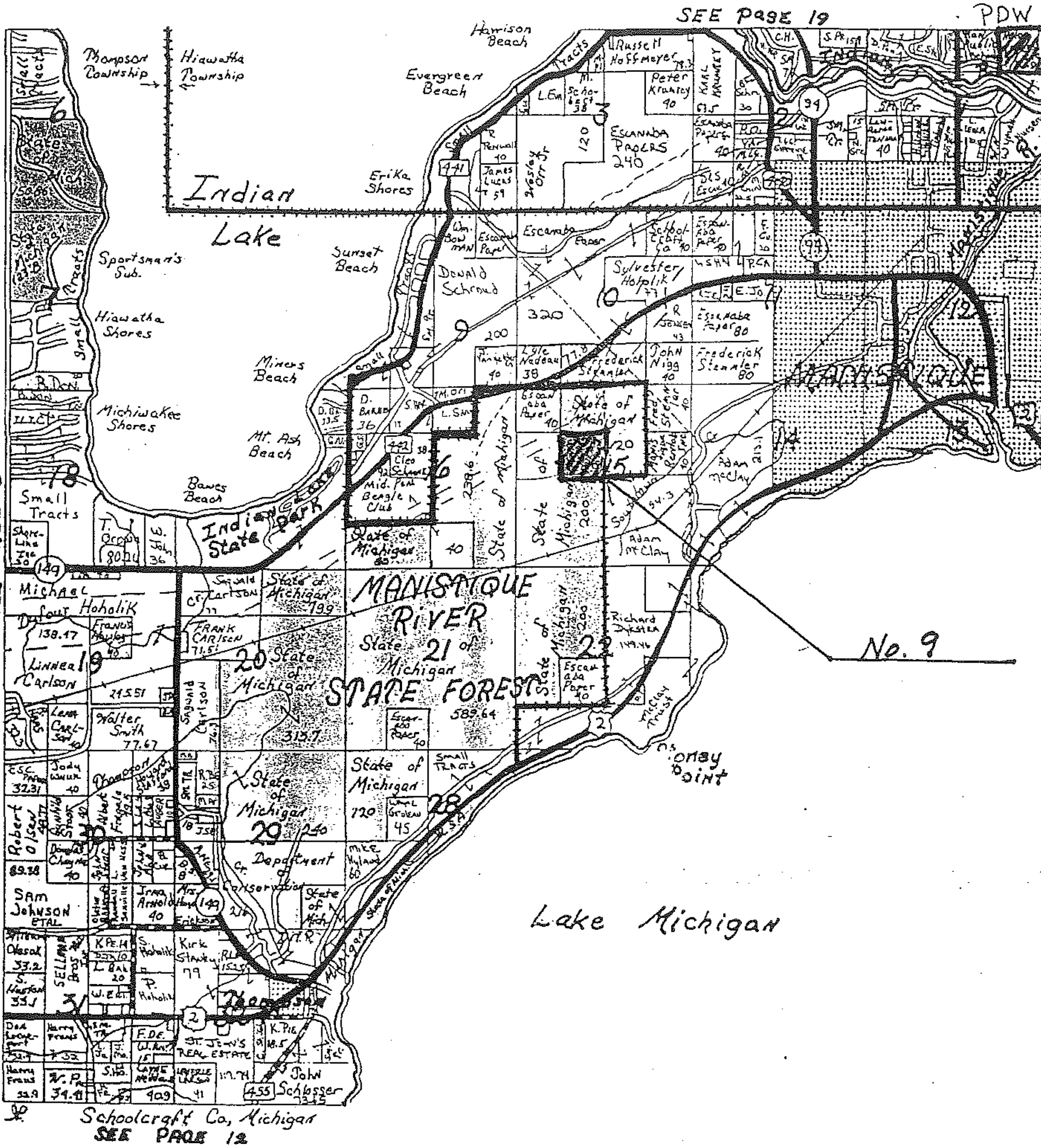
PART OF THOMPSON SOUTH PART HIAWATHA T. 41 N.-R.16 W.

Schoolcraft Co.



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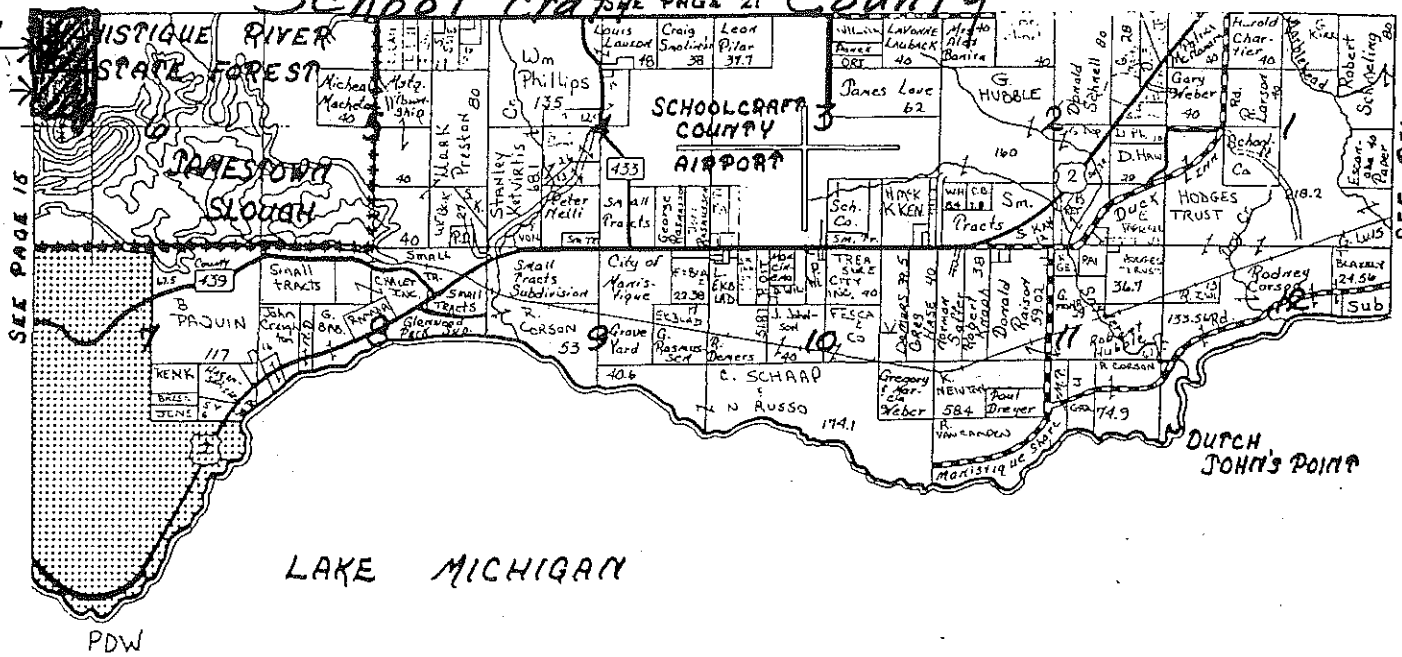
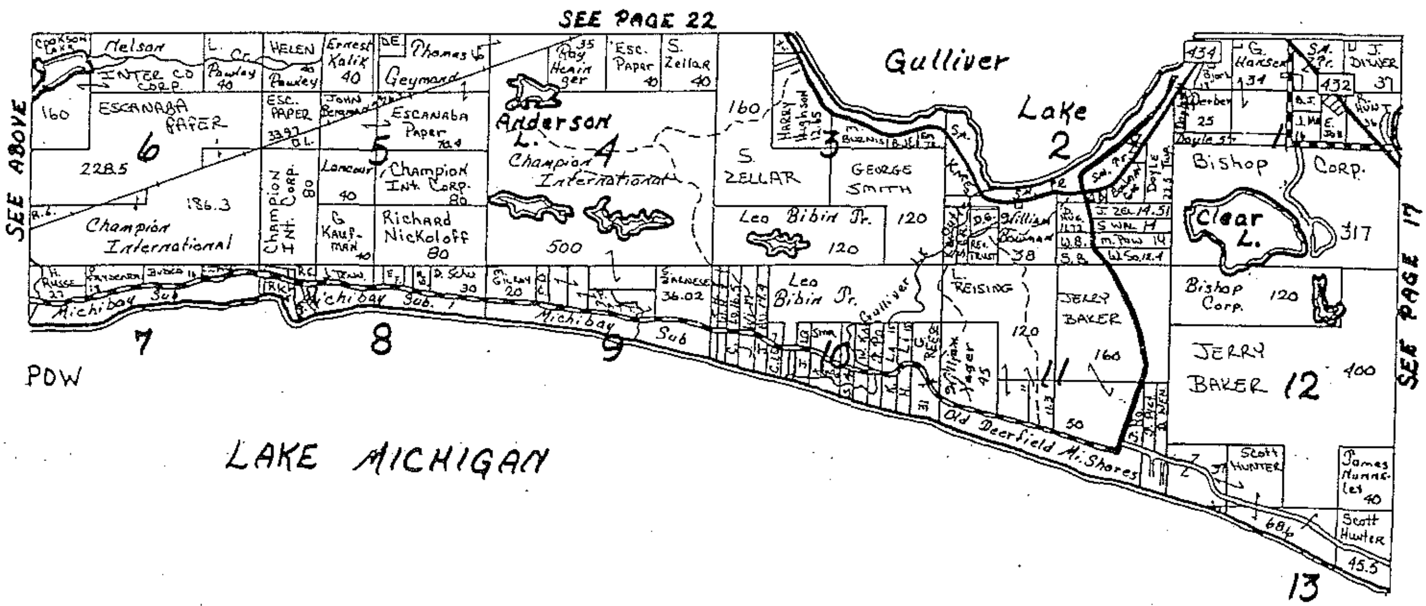
SOUTH PART MANISTIQUE T. 41 N.-R. 15 W.

School craft County



SOUTH PART DOYLE T. 41 N.-R. 14 W.



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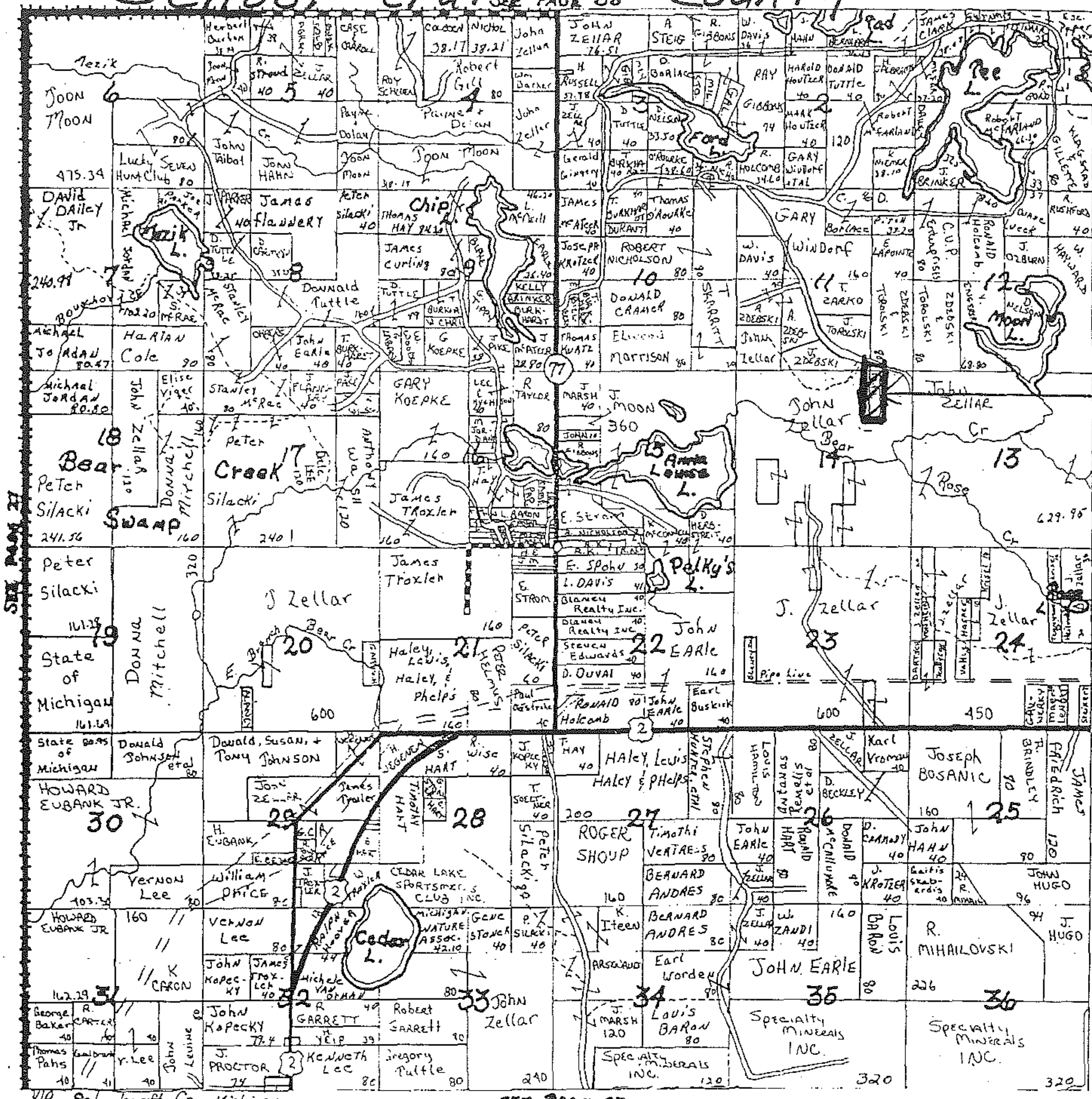
School craft County

SEE PAGE 36



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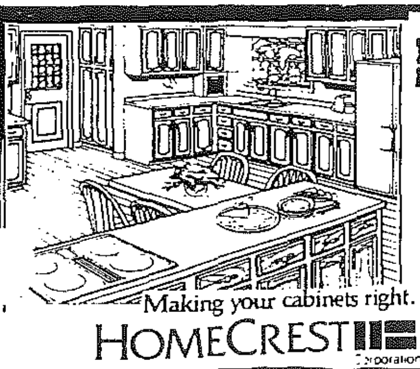

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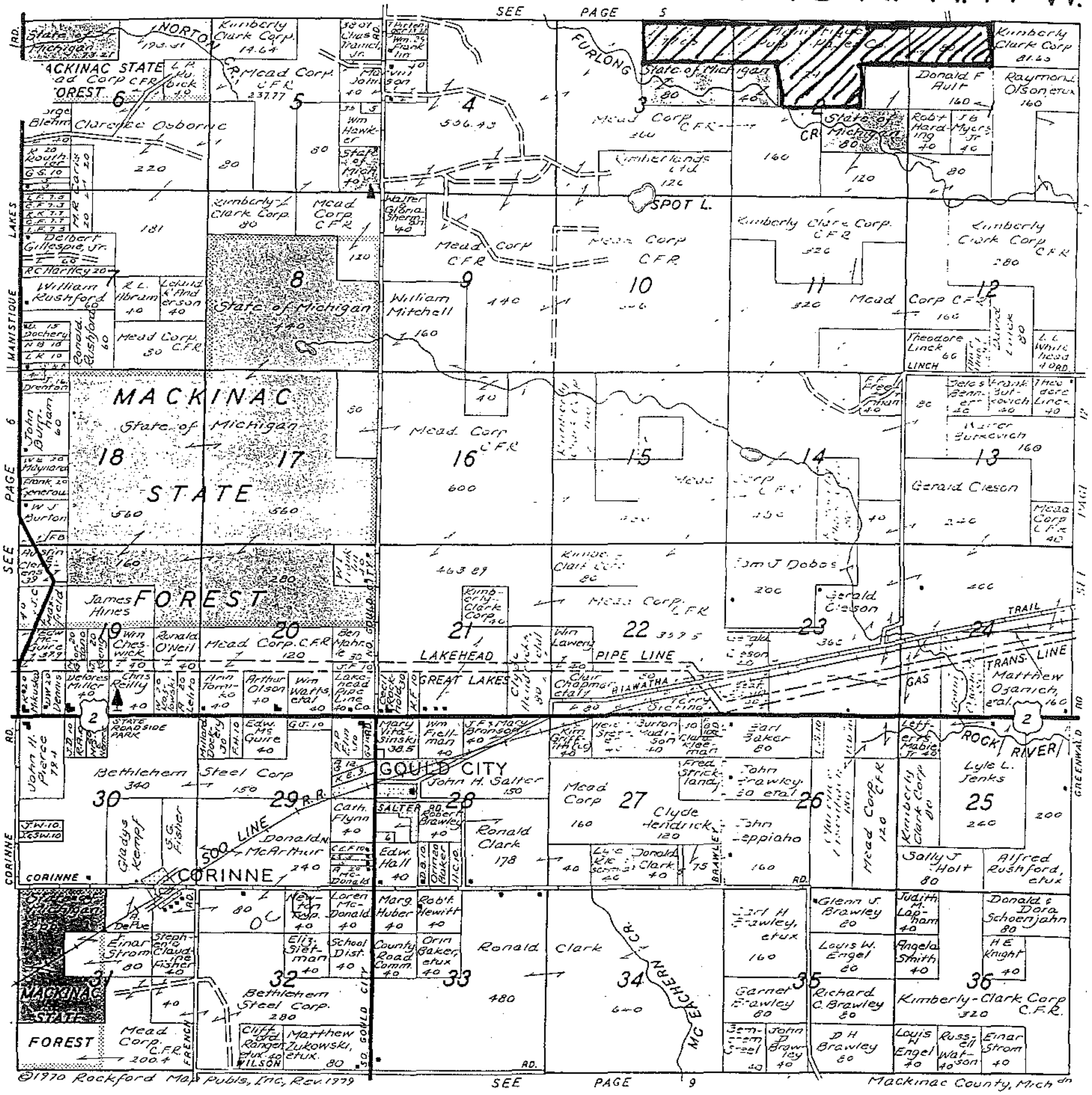
NORTHEAST PART NEWTON T. 43 N.-R. 11 W.



MACKINAC County
Site Nos. 1 – 5

-15

CENTRAL PART **PENTLAND** T.45N.-R.9W.

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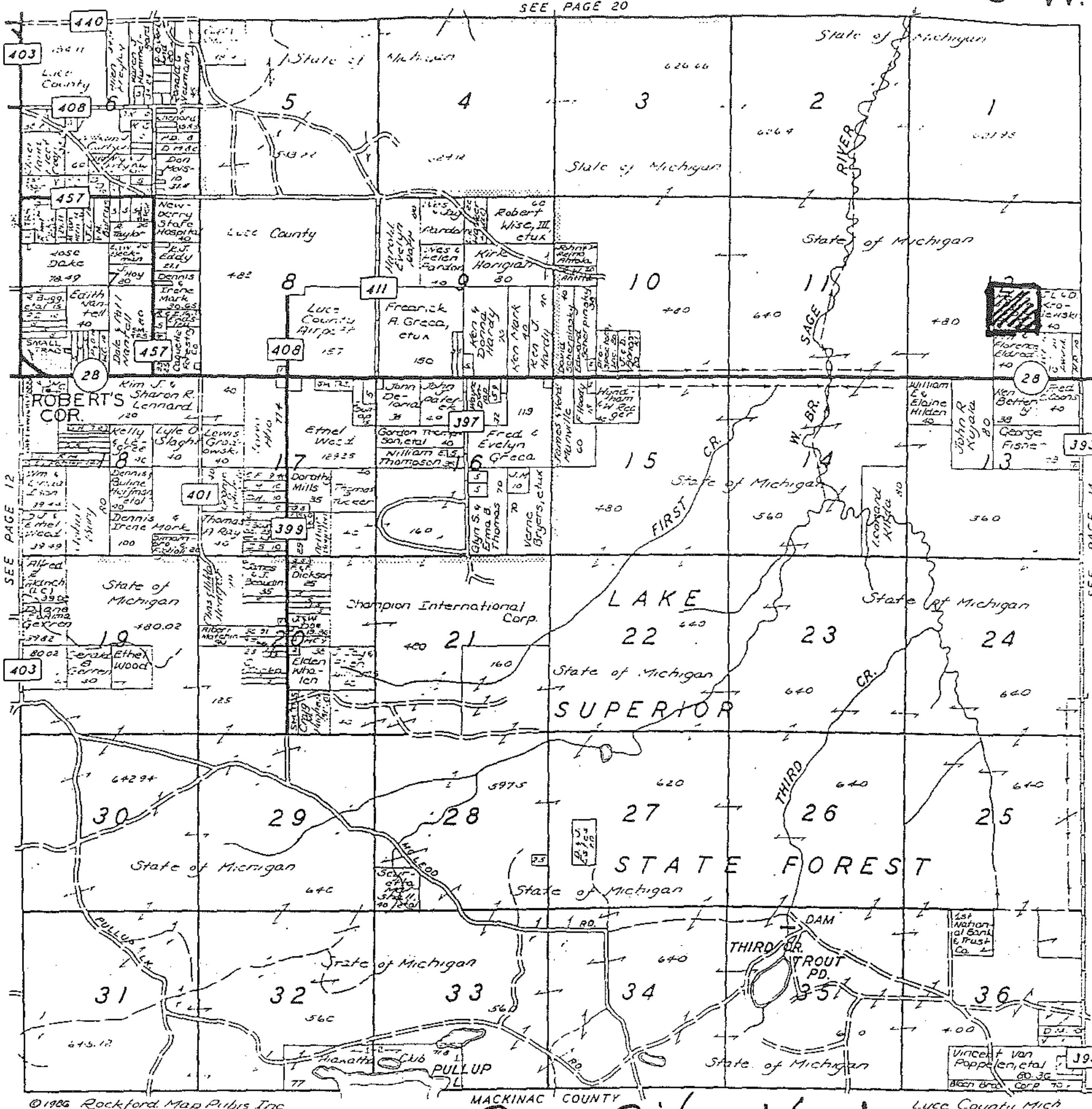

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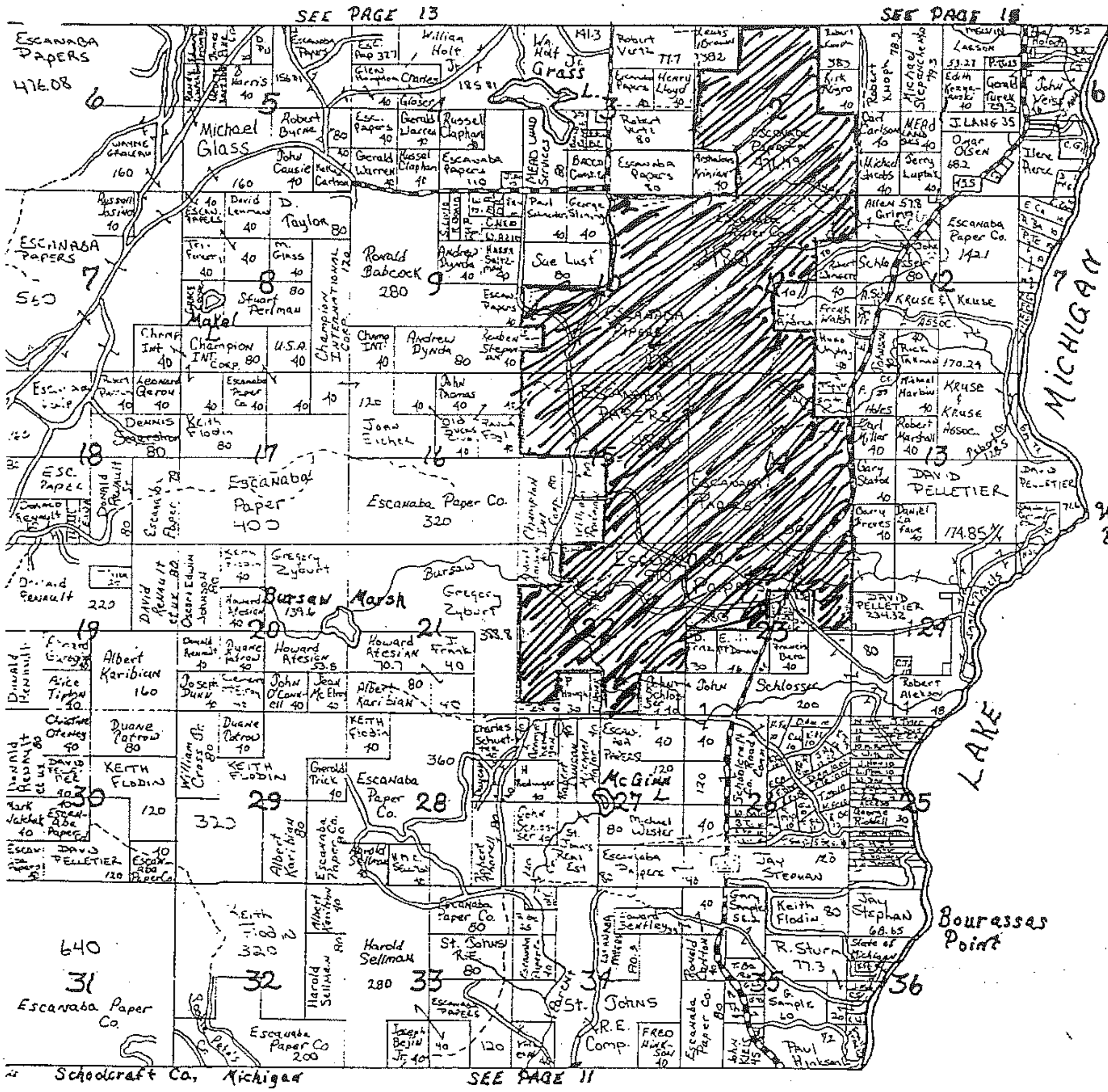
MANISTIQUE PAPERS INC.

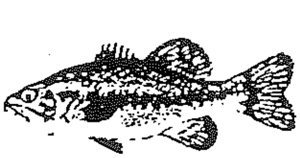
SITE EVALUATION FOR FUTURE RESIDUAL MANAGEMENT AREAS

Subsequent to the initial evaluation of three sites for relocation of residual wastes for Manistique Papers, Inc., it was determined that additional site evaluations would be made. A preliminary review at additional sites has been made from existing maps to determine pertinent information to each site regarding ability to meet Act 641 requirements, property ownership, natural features, distances from mill and accessibility.

<u>SITE NO. 1</u> Is located about nine miles southwest of Manistique and about three miles southwest of Thompson in Thompson Township just east of County Road 435 (Little Harbor Road). This tract consists of about 3,300 acres in sections 2, 10. 11, 14, 15, 22, 23, T.40 N. R. 17 W. Property is owned by Escanaba Paper Co. and bordered by privately owned 40 acre parcels primarily used for hunting and recreation. Ground elevations range from about 660 ft. M.S.L. to about 695 ft. M.S.L. The eastern and southern part of this tract contains the head waters for several small creeks which drain in an easterly direction into Lake Michigan. Depth to groundwater from surface varies from the surface to forty feet (taken from "Reconnaissance of Ground-Water Resources of Schoolcraft County by William C. Sinclair, 1959). Three wells drilled in Section 28; other drilled or driven wells indicate bed rock down from 12 to 20 feet in the northern portion and 47 to 55 feet along County Road 435. From personal observations, the overburden appears to be of a tight nature. Access is excellent as far as Thompson with a gravel access road beyond Thompson. Winter travel should not present a problem. Electrical power is available along county Road 435. Isolation from property lines easily maintained. It is estimated that about 60% of the area would be classified as Wetlands and it would be difficult to acquire the acreage necessary to meet the requirements. Isolation from streams and groundwater isolation would be a problem. There are no lakes to be concerned with, no railways, no pipelines.

SITE No. 1





Welcome to Thompson

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Home Of Big Springs

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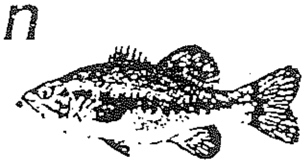
Thompson Township Board

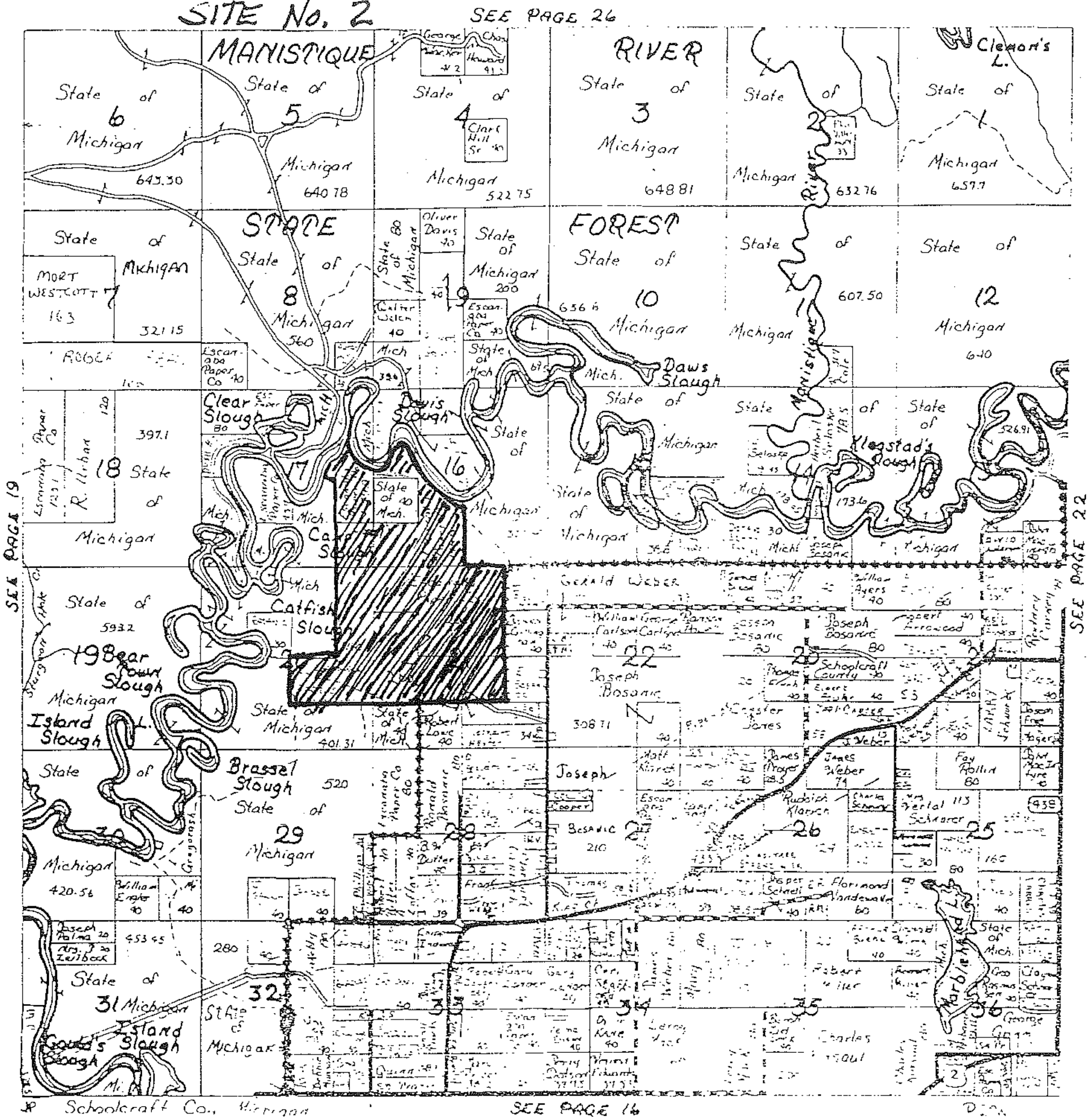


SITE NO. 2 Is located about six miles north-east of Manistique and two miles north of County Road 433 (River Road). It covers roughly 950 acres in Sections 16, 17, 20, and 21, T.42 N. R.15 W., Manistique Township. Except for one 40-acre parcel in Section 16, this tract is owned by Escanaba Paper Co. This tract is almost completely surrounded by State of Michigan ownership. Property bordering on the south and toward the east and on the east toward the south half is privately owned with year round habitation. Ground elevations for the most part is in the 615 ft. M.S. L. range except for the eastern and south eastern portion which is about 650 ft. M.S.L. No more than a total of 80 acres would be above the 615 ft M.S.L. range. A considerable amount of acreage would be taken as isolation distances from neighboring domiciles. Access to this tract is fair to good. Winter travel could cause some concern. This tract would be considered about 90 to 95 percent wetlands. Borrow for land fill construction would be a concern. Power is readily available. At ground elevations of 615 to 620 ft. M.S. L. Bed rock would probably be ten to twenty feet below surface. Groundwater elevation is very likely to be two to five feet below the surface for the greater part of this site.

SOUTH CENTRAL PART

MANISTIQUE

T. 42 N.-R.15 W.



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<u>SITE NO. 3</u> Is located about 10 miles west of Manistique along Highway U.S. 2 and 1/2 mile north of the Highway in Section 27, T.41 N. R.17 W., Inwood Township; 400 acres owned by the U.S. Government. Eighty-plus acres of this parcel lie south of the Wisconsin Central Railroad with the remainder located north of the railroad. The tract is completely surrounded by State owned property except for one bordering 40 acres on the northwest edge which is privately owned. Surface geology is sandy lake plain and is well drained. Ground surface elevations are 715 ft. to 740 ft. above M.S.L. Groundwater levels could be within five to ten feet from the surface in the western part of the tract with more separation toward the eastern border. The Wisconsin Central Railroad traverses the southern edge of the tract from west to east dividing about 80 acres from the main parcel. Nearest source of electrical power would be from the village of Cooks, about 2 1/2 miles west of the area. A Class-A Road (U.S. Highway 2) could provide access year around. Borrow would be readily available on site. There are no identifiable wetlands on the topographical map.

SITE No. 3

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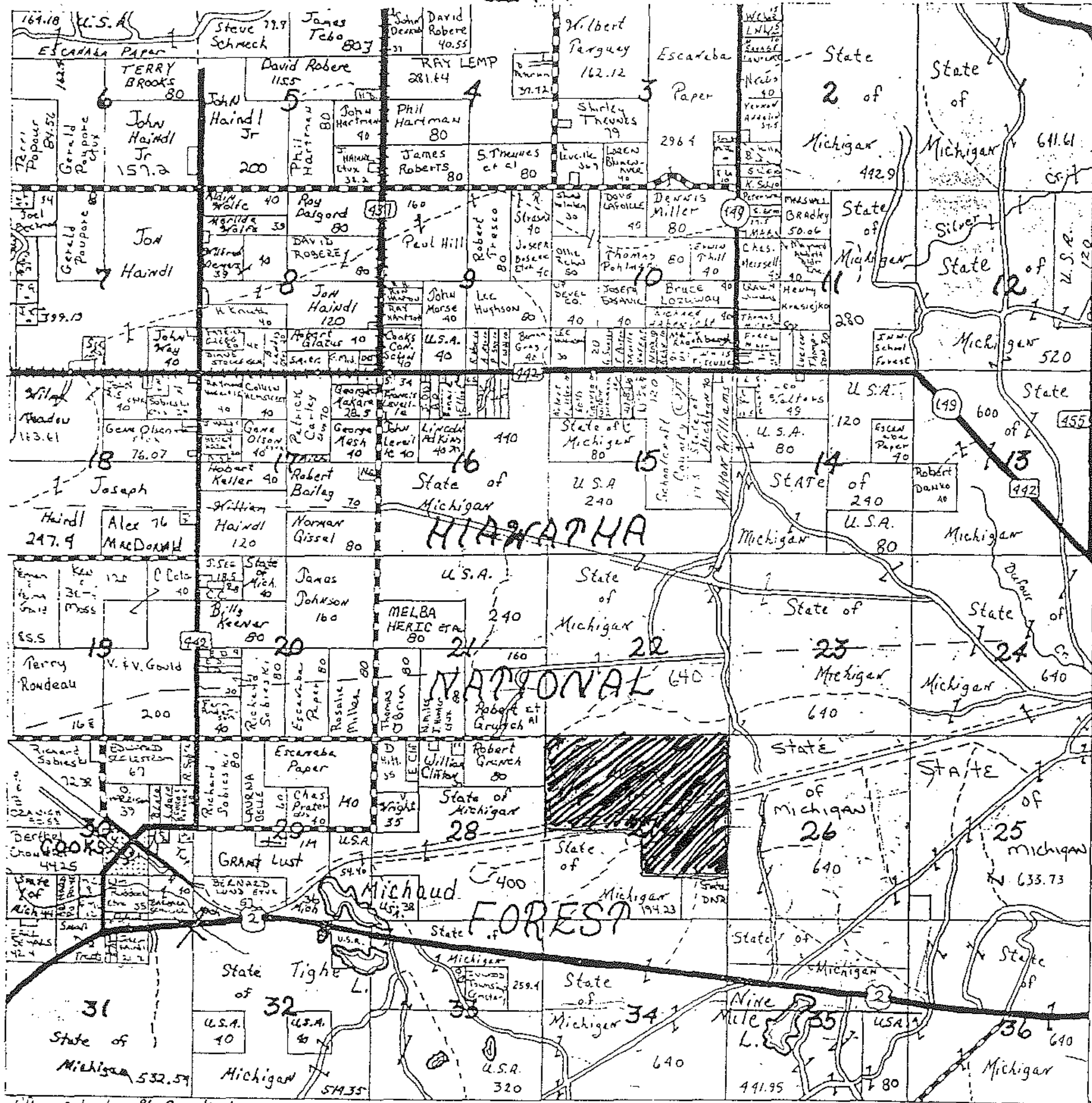

SEE PAGE 12

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SITE NO. 4 Is located in the NW 1/4 NW 1/4 and SW 1/4 NW 1/4 Sec. 6, T.42N - R 15W Manistique Township. NE 1/4 NE 1/4 Sec. 1, T.42N. - R 16W., Thompson Township. This is a 120 acre parcel owned by Manistique Papers, Inc. The site is bordered by state owned property on the east and by Manistique Papers, Inc. property on the north with the Manistique River touching the very northeast corner of the site. The northeast 40 acres is adjacent to a 40 acre plot owned by Manistique Public Schools on the east side and Wyman State Nursery property on the south side. The Wyman tract has a common border with the southern most 40 acres of the site. Surface geology consists of swamp deposits, saturated sandy and silty lake-plain deposits. Groundwater elevations are estimated to be less than 10 feet below ground level with some wetlands on the site. Bedrock could be anywhere from near surface to 20 feet based on "Reconnaissance of Ground-Water Resources of Schoolcraft County." U.S. Geological Survey report: by Wm. C. Sinclair.

Site No. 4

THOMPSON T.42 N.-R.16 W SOUTH CENTRAL PART MANISTIQUE

T 42 N - R 15 W

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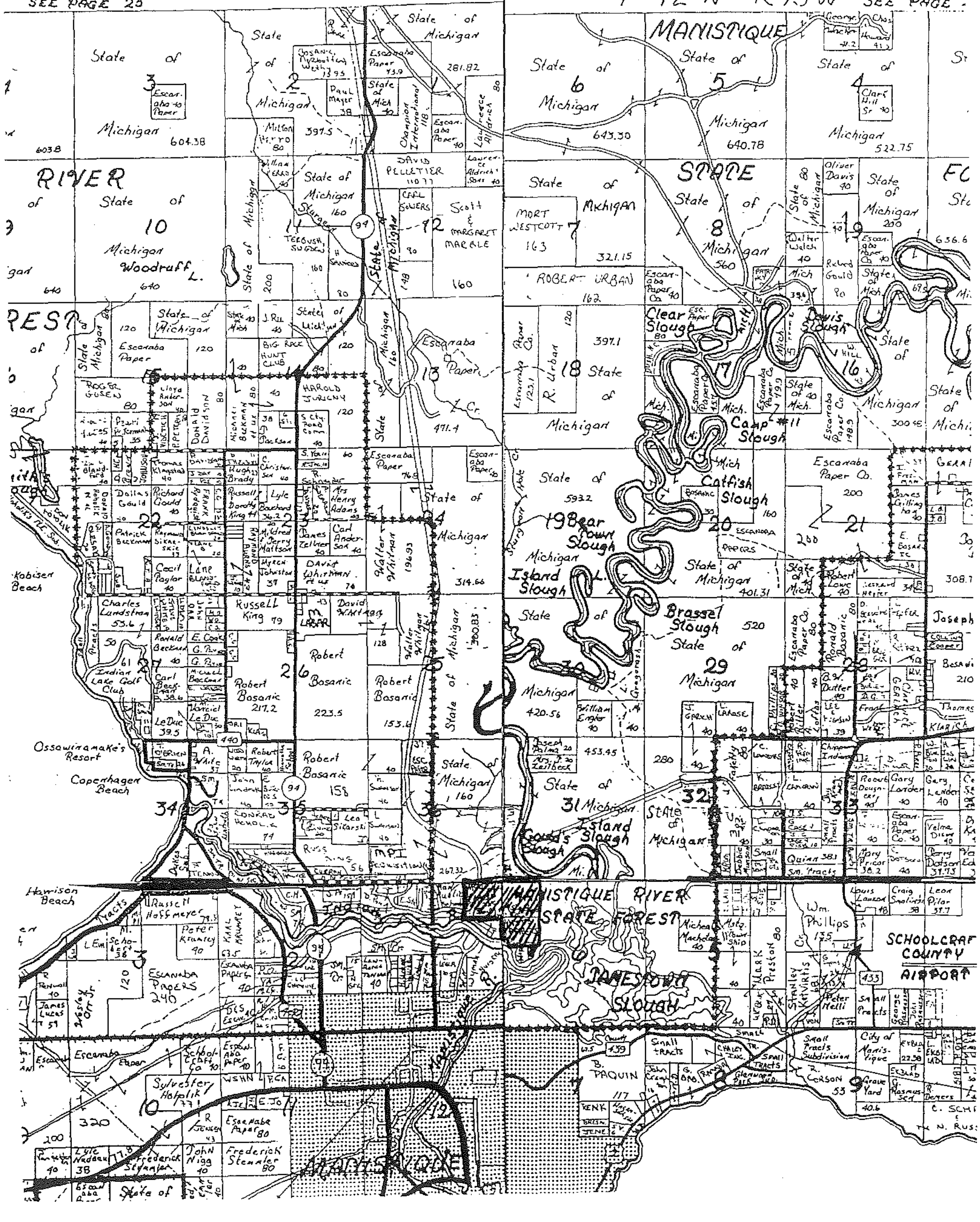
SEE PAGE

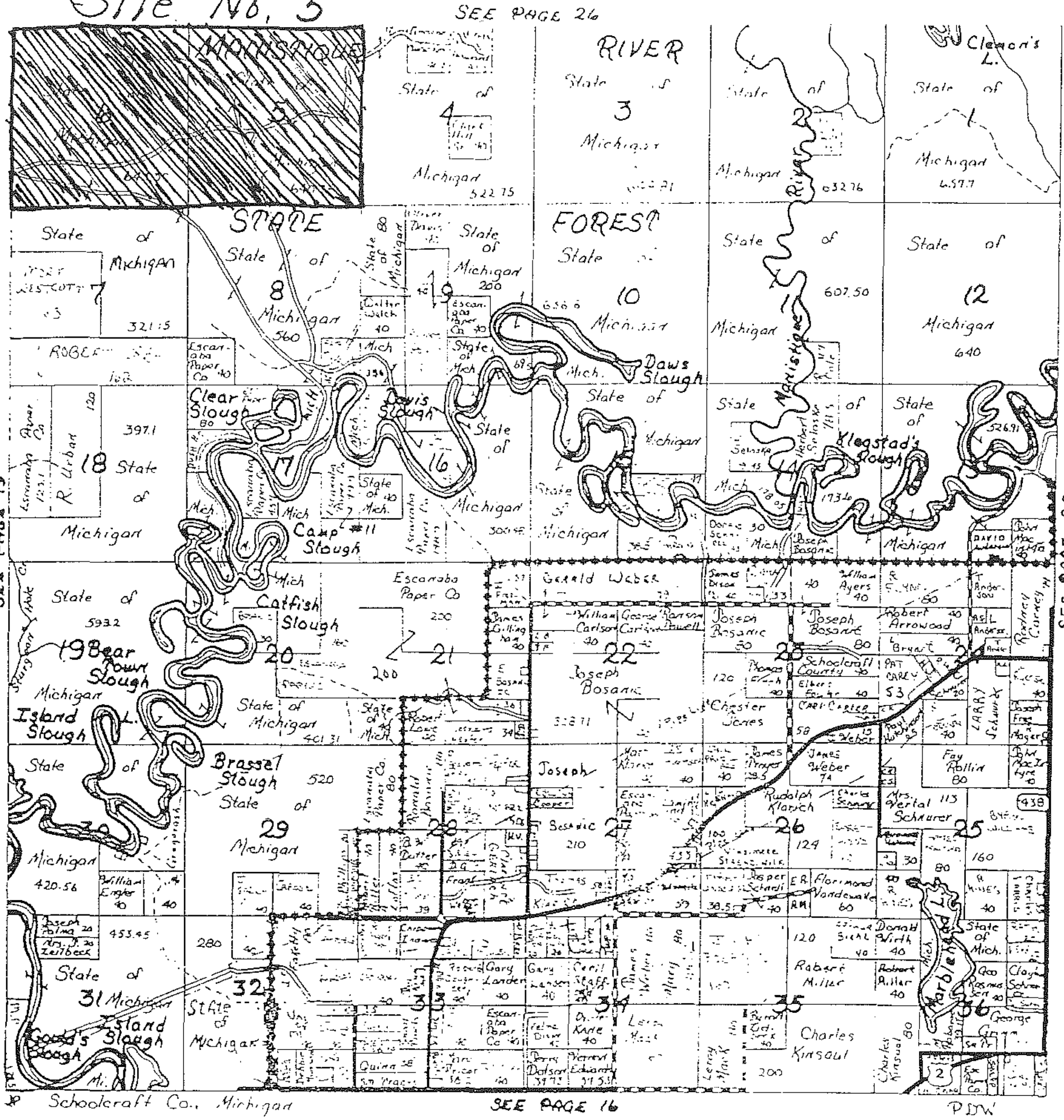


__SITE NO. 5__ Is located in Sections 5 and 6, T.42 N. - R-15W., Manistique Township, nine miles north of Manistique on State Highway M-94 and two miles east of M-94 Highway in Manistique River State Forest. This site is totally owned by State of Michigan. Boundaries are a minimum of one 40 acre parcel away from any privately owned property except on the southwest edge of Section 6.

The distance from the surface to the groundwater table is unknown for this area. The surface geology consists of sandy lake-plain with bedrock elevations varying in depth at surrounding locations from 90' to 200'. Driving distance from mill would be nine to ten miles one way. Ground elevation ranges from about 700 feet M.S.L. to 710 feet M.S.L., which is approximately 50 feet above any identifiable wetlands. The geographic center of this area would be in excess of one mile from any private ownership, wetlands, and the Manistique River. Year-around access to this site is excellent via highway M-94.

SOUTH CENTRAL PART MANISTIQUE T. 42 N.-R. 15 W.

Site No. 5



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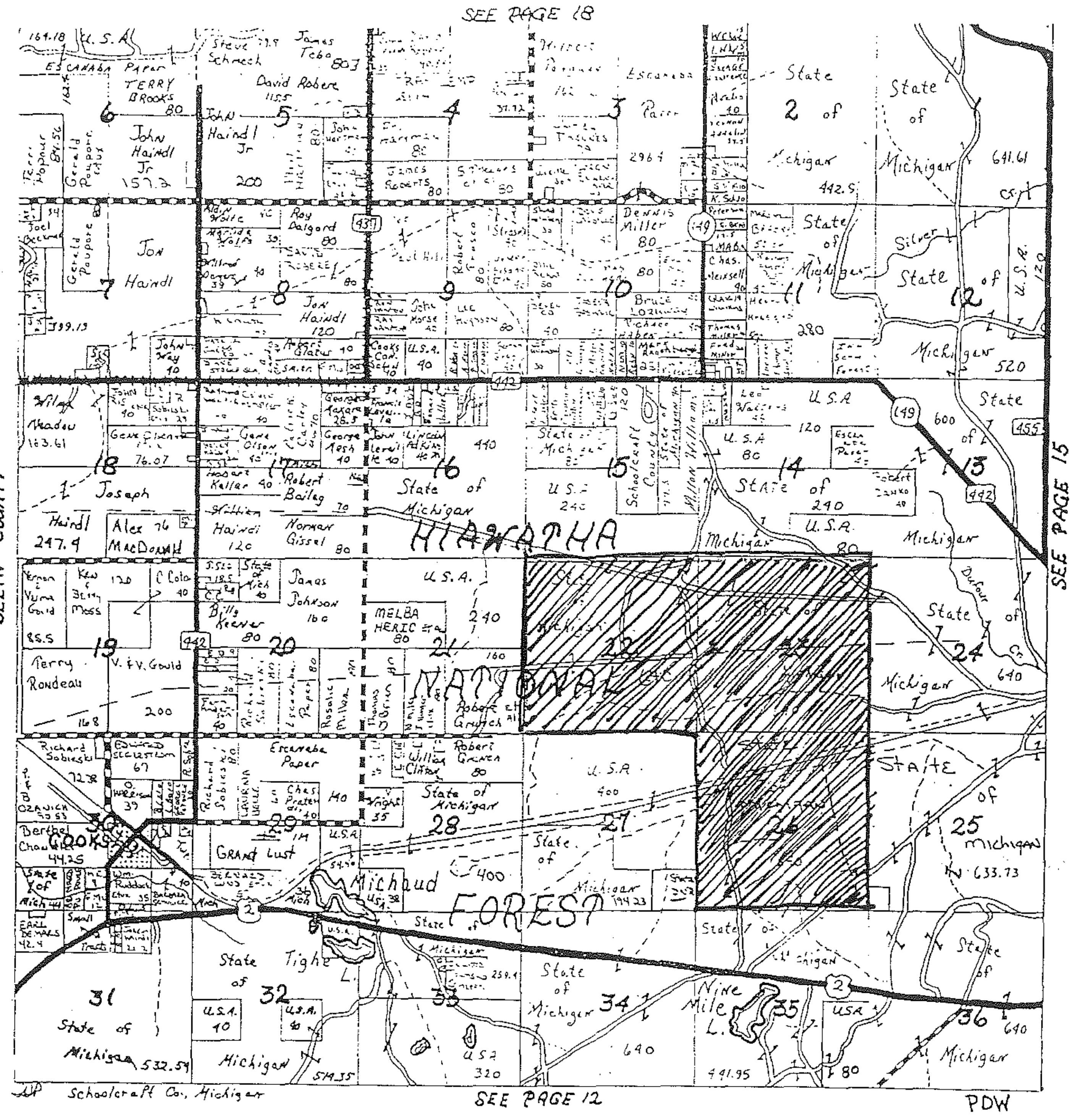
<u>SITE NO. 6</u> Is located in Secs. 22, 23, 26, T.41 N., R. 17 W., Inwood Township, 0.5 to 2.5 miles north of U.S. Highway 2 and eight miles west of Manistique on Highway 2. Ownership is with the State of Michigan. Surface Geology is sandy lake-plain with well drained overburden. Groundwater on the eastern extremities of the site in Sections 23 and 26, could be rather shallow. However groundwater levels appear to be near 50 feet from the surface in Section 15, one mile north of Section 22. Ground surface elevations range from about 680 feet on the eastern parts of Sections 2 and 26 to about 705 feet at the eastern edge of these sections. Elevations in Section 22 range from about 689 feet to about 738 feet M.S.L. There are no identifiable wetlands on the topographical coverage of this area. Each of the sections are bordered by state owned or federally owned property except the southwest 1/4 of Section 22 which is bordered by privately owned property year around. Access to this site is excellent. Two pipelines traverse the north half of Sections 22 and 23 from east to west.

Site No. 6



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HYDROGEOLOGICAL STUDY
FOR
MANISTIQUE PAPER'S INC.
RESIDUALS MANAGEMENT SITE
SECTION 36, T42N, R16W
HIAWATHA TOWNSHIP
SCHOOLCRAFT, MICHIGAN

Prepared by:

BITTNER ENGINEERING, INC.
614 LUDINGTON STREET
ESCANABA, MICHIGAN 49829

DENNIS B. BITTNER, P. E.

JANUARY 1988

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DMS
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HYDROGEOLOGICAL STUDY
FOR
MANISTIQUE PAPER'S INC.
RESIDUALS MANAGEMENT SITE
SECTION 36, T42N, R16W
HIAWATHA TOWNSHIP
SCHOOLCRAFT, MICHIGAN

Prepared by:

BITTNER ENGINEERING, INC.
614 LUDINGTON STREET
ESCANABA, MICHIGAN 49829

STATE OF MICHIGAN
DENNIS B. BITTNER
ENGINEER
NO.
27115
LICENSED PROFESSIONAL ENGINEER

DENNIS B. BITTNER, P. E.

JANUARY 1988

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APPENDICES

SUMMARY AND CONCLUSIONS:

1. Manistique Papers, Inc. places residuals from its paper manufacturing operation in a company owned site in Section 36, T42N, R16 W, Hiawatha Township, Schoolcraft County, which has been in operation since 1973.

2. The Michigan Department of Natural Resources has authorized use of this site for this purpose in NPDES Permit # MI0003166 issued to Manistique Papers, Inc.

3. Manistique Papers, Inc. has conducted a hydrogeological investigation of this site at the request of the Michigan Department of Natural Resources.

4. The hydrogeological study shows that the material currently being placed at the site as well as the material previously placed in the site meet the definition of inert as contained in the Michigan Department of Natural Resource's "Solid Waste Designation Guideline", February, 1987 and, therefore, is suitable for placement at this site.

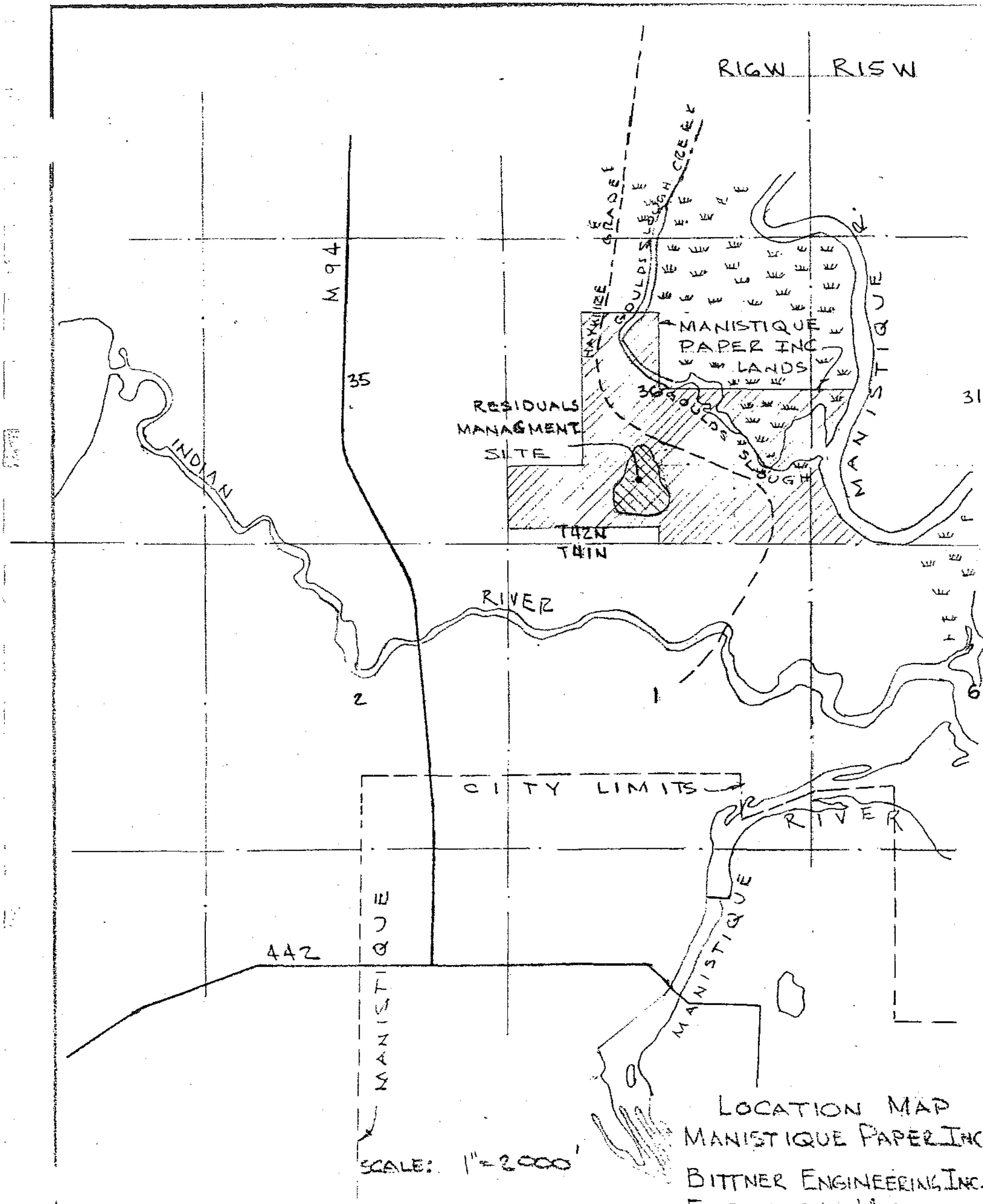
5. The study also shows that groundwater in the vicinity of the site substantially conforms to 40 CFR 257.3-4 and to Appendix I of 40 CFR 257 and therefore the site does not adversely impact groundwater in the area.

MANISTIQUE PAPERS, INC.
HYDROGEOLOGICAL REPORT
RESIDUALS MANAGEMENT SITE

INTRODUCTION:

Manistique Papers, Inc. operates a paper mill at Manistique, Michigan which produces a variety of paper products. Raw materials consist of recycled paper plus various additives necessary to furnish the quality and color required by customers. The major products are specialty types of newsprint. Residuals, principally consisting of dewatered wastewater treatment plant sludge from the mill's wastewater treatment facility plus smaller amounts of fly ash and bottom ash and miscellaneous wood and paper wastes such as pallets, other shipping material and rejected bales of waste paper, are produced in conjunction with the paper manufacturing process.

Residuals from the mill has been placed in a company owned and operated site since 1973. This site is unlined and is operated as an above ground site. Ash is used as daily cover material. About 50% of the site has been revegetated with grass. Authorization to use this site for this purpose is contained in the company's National Pollutant Discharge Elimination System (NPDES) permit number MI0003166. This permit was reissued in 1985 and expires on August 31, 1990. At the request of the Michigan Department of Natural Resources, a hydrogeological study was performed at this site. The study was carried out in accordance with a work study plan which was submitted to the Michigan Department of Natural Resources on May 27, 1986, revised on July 24, 1986 and February 9, 1987 and approved by the Michigan Department of Natural Resources on February 23, 1987. The approved work study plan proposed to perform the following work: determine the horizontal groundwater gradient of



SCALE: 1" = 2000'

LOCATION MAP
MANISTIQUE PAPER INC.

BITTNER ENGINEERING INC.
ESCANABA, MICHIGAN

FIG. 1

the site by installing six groundwater observation wells; conduct soil borings at 15 locations; collect soil samples at boring and well locations to determine soil characteristics; collect and analyze samples from groundwater observation wells; perform leaching tests on the sludge and fly ash which is being deposited at the site; and prepare a hydrogeological study report including all the study information.

SITE DESCRIPTION:

The 230 acre site is located about 1 1/2 miles north of the City of Manistique in the E 1/2 of the SW 1/4 of Sec. 36, T42N, R16W, Hiawatha Township, Schoolcraft County. The site is located about 1 mile east of M-94, with access provided by Frankovitch Road. Figure 1 is a location map of the site. The site is very flat with an elevation change of less than 10' over the entire 45 acres that are currently under active use. The ground slopes slightly to the north - northeast at between 0.5% and 1.0%. Material has been placed on approximately 45 acres. A total of 80 acres have been evaluated in this hydrogeological study. The site contains 230 acres which are considered suitable for disposal of the plant residuals and is the acreage specified in the Schoolcraft County Slid Waste Management Plan (June, 1983) and in a Department of Natural Resource's evaluation of the site. The 80 acre area should provide ample area for disposal for approximately 50 years using the current method of operation. Filling has occurred from depths ranging from a few feet to approximately 45 feet above the natural ground elevation. The natural and completed elevations of the site are shown in Figure 2.

The 230 acre site is situated within approximately 480 acres owned by Manistique Papers, Inc.. Landowners adjacent to the site are the State of Michigan to the northeast, Manistique Area Schools to the southeast, Nick

Frankovitch to the south and Henry Swanson to the west. Figure 3 indicates property ownership in the area.

Surface drainage across the site is to the east and northeast towards Gould's Slough (Creek), a tributary to the Manistique River. Gould's Slough has the physical characteristics of a creek before it converges with the Manistique River. Downstream from the confluence of these streams, and about 1.5 miles east of the site, an extensive marshy area, also known as Gould's Slough, is located along the Manistique River before it converges with the Indian River. These streams flow in a general southerly direction.

The site is largely cleared with mixed conifers and hardwoods sparsely scattered around the site. Ground cover in the area and observations made during data collection activities indicate that the water table is naturally shallow.

SOIL AND GROUNDWATER INVESTIGATIONS:

Soil borings were performed at 18 locations at this site. Seven of the borings were performed at locations within the active disposal area while the remaining 11 boring locations were at locations around the perimeter of the active area. Observation wells were installed at 7 of the boring locations. Locations of the borings and wells are shown in Figure 2. An attempt was made to obtain split spoon samples or shelby tube samples at 5 foot intervals at the boring locations. At locations where split spoon or shelby tubes could not be obtained, a loose sample was collected. Table 1 summarizes the boring locations, the type of sample, depth of samples and the laboratory and field testing procedures that were performed. Table 2 contains the results of soil testing.

Groundwater monitoring consisted of collecting a single set of samples

MANISTIQUE PAPERS, INC.
HYDROGEOLOGICAL STUDY
TABLE 1
SUMMARY OF BORING ACTIVITIES

BORING I.D.	SAMPLE DEPTHS	TYPE OF SAMPLE (a)	ANALYSIS PERFORMED	WELL INSTALLED
B-1 - "A"	2' - 4'	S. S.		Yes: W-1
	7'	S. S.	Sieve	
	10' - 12'	S. S.	Permeability - Field; CEC	
	15'	S. S.	Sieve	
	18' - 20.5'	Auger	Sieve	
B-2 - "B"	2' - 3'	S. S.	Sieve	No
	7'	S. S.		
	12'	S. S.		
B-3 - "C"	2' - 3.5'	S. S.		No
	5' - 6.5'	S. S.	Sieve	
B-4 - "D"	2' - 3.5'	S. S.		No
	5' - 6.5'	S. S.		
B-5 - "E"	1' - 2'	S. S.		No
B-6 - "F"	1' - 2'	S. S.	Sieve	No
	5' - 6.5'	S. S.	Sieve	
B-7 - "G"	1' - 2'	S. T.	Permeability - Lab	No
	2' - 5'	Auger	ASTM Leachate	
B-8 - "H"	0' - 1'	S. S.		No
	4' - 5'	S. S.	Sieve	
	10' - 11'	S. S.	Sieve	

MANISTIQUE PAPERS, INC.
HYDROGEOLOGICAL STUDY
TABLE 1 (CONTINUED)
SUMMARY OF BORING ACTIVITIES

BORING I.D.	SAMPLE DEPTHS	TYPE OF SAMPLE	ANALYSIS PERFORMED	WELL INSTALLED
B-9 - "J"	0' - 2'	S. S.	ASTM Leachate on Composite	No
	7' - 8'	S. S.	Permeability - Lab	
	8' - 9.6'	S. T.		
	12' - 13.3'	S. S.		
	17' - 18.5'	S. S.		
B-10 - "K"	2' - 3'	S. S.		No
	7' - 8.5'	S. S.	ASTM Leachate on Composite	
	12' - 13'	S. S.		
	13' - 15'	S. T.		
	17' - 18.5'	S. S.		
	22' - 23.5'	S. S.		
	27' - 28.5'	S. S.		
	32' - 33.5'	S. S.		
B-11 - "L"	2' - 3'	S. S.		No
	7' - 9.5'	S. S.	ASTM Leachate on Composite	
	12' - 13'	S. S.		
	13' - 15'	S. T.	Permeability - Lab	
	17' - 18.5'	S. S.		
	22' - 23.5'	S. S.		
	27' - 28.5'	S. S.		
	32' - 33.5'	S. S.		
	37' - 38.5'	S. S.		

MANISTIQUE PAPERS, INC.
HYDROGEOLOGICAL STUDY
TABLE 1 (CONTINUED)
SUMMARY OF BORING ACTIVITIES

BORING I.D.	SAMPLE DEPTHS	TYPE OF SAMPLE	ANALYSIS PERFORMED	WELL INSTALLED
B-12 - "M"	2' - 3'	S. S.		No
	7' - 8.5'	S. S.	ASTM Leachate on Composite	
	12' - 13.5	S. S.		
	17' - 18.5'	S. S.		
	22' - 23'	S. S.		
	23' - 25'	S. T.	Permeability - Lab	
	27' - 28.5'	S. S.		
	32' - 33.5'	S. S.		
	37' - 38.5'	S. S.		
	42' - 43'	S. S.		
W-2	4' - 9'	Auger	Sieve, CEC	Yes - W-2
W-3	2' - 3'	S. S.		Yes - W-3
	5' - 6'	S. S.	CEC	
	8'		Permeability - Field	
W-4	0' - 1'	S. S.	Sieve	Yes - W-4
	5' - 6.5'	S. S.	Sieve	
	10' - 12'	S. S.	Permeability - Field, CEC	
	15.5' - 16'	S. S.	Sieve	
W-5	1' - 2'	S. S.		Yes - W-5
	4' - 5.5'	S. S.	CEC	
W-6	0' - 2'	S. S.	CEC	Yes - W-6
W-7	None			Yes - W-7

(a) S. S. = Split Spoon Sample
S. T. = Shleby Tube Sample

MANISTIQUE PAPERS, INC.
HYDROGEOLOGICAL STUDY
TABLE 2
RESULTS OF SOIL TESTS - FIELD & LABORATORY

SAMPLE LOCATION	SAMPLE DEPTH	PERMEABILITY	SIEVE	CATION EXCHANGE CAPACITY (MEG/ 100G SOIL)
B-1 - "A"	7'		Dark Brown Silty Sand	3.10
	10' - 12'	1.03×10^{-2} cm/sec		
	15'		Brown Sand	
	18' - 20.5'		Grayish Brown Silty Sand With Some Clay and Organic Material	
B-3 - "C"	5' - 6.5'		Brown Silty Sand	
B-6 - "F"	1' - 2'		Brown Silty Sand With Some Clay & Organic Material	
B-7 - "G"	1' - 2'	3.24×10^{-6} cm/sec		
B-8 - "H"	4' - 5'		Brown Sand	
	10' - 11'		Grayish Brown Silty Sand	
B-9 - "J"	8' - 9.6'	1.15×10^{-5} cm/sec		
B-10 - "K"	13' - 15'	2.62×10^{-6} cm/sec		
B-11 - "L"	13' - 15'	6.34×10^{-5} cm/sec		
B-12 - "M"	23' - 25'	3.63×10^{-6} cm/sec		

MANISTIQUE PAPERS, INC.
HYDROGEOLOGICAL STUDY
TABLE 2 (CONTINUED)
RESULTS OF SOIL TESTS - FIELD & LABORATORY

SAMPLE LOCATION	SAMPLE DEPTH	PERMEABILITY	SIEVE	CATION EXCHANGE CAPACITY (MEG/ 100G SOIL)
W - 2	2' - 3'		Clean, Reddish Brown Sand	3.52
W - 3	5' - 6'			2.11
	8'	1.95 x 10^{-3} cm/sec		
W - 4	0' - 1'		Brown Sand	
	5' - 6.5'		Brown Sand	
	10' - 12'	1.70 x 10^{-3} cm/sec		0.81
	15.5' - 16'		Dark Silty Sand With Some Organic Material	
W - 5	1' - 2'			5.49
W - 6	0' - 2'			5.03

from each observation well and measuring the static water levels in the wells on 3 separate occasions. Results of the monitoring well samples are included in Table 3.

SITE MAPPING:

A topographic survey of the site area was completed by obtaining direct measurements of horizontal and vertical features of the site. Elevations of the site were obtained on a 100 x 100 foot grid system with a benchmark for horizontal control being established near the southern boundary of the site. The location of all existing site improvements such as roads, culverts, property boundaries etc. were determined as well as the location of the borings and observation wells which were installed during the study.

A 100 scale map of the entire site was prepared and is included as Figure 2. This map presents all horizontal and vertical information obtained during the field survey.

A legal survey of the landfill site including adjacent properties owned by Manistique Papers, Inc. was previously completed by a registered land surveyor. A copy of this survey is also included in Appendix G.

SOIL AND BEDROCK CONDITIONS:

Results of permeability testing, sieve analyses and cation exchange capacities along with driller's logs indicate that native soils over the entire site fall in the range of coarse to medium sands. The average permeability for these sandy soils is 4.65×10^{-3} cm/sec while the average cation exchange capacity is 2.87. All sample results were in the range which is typical of sand and indicates a lack of organic or clay like material in the sandy zone. Some boring logs show the presence of 1' - 4' of organic soil

MANISTIQUE PAPERS, INC.
HYDROGEOLOGICAL STUDY
TABLE 3
RESULTS OF OBSERVATION WELL SAMPLING

PARAMETER	SAMPLE LOCATION W-1	W-2	W-3	W-4	W-5	W-6	W-7	Bailer Blank
Date	6/8/87	6/8/87	6/8/87	6/8/87	6/8/87	6/8/87	7/17/87	
pH (S.U.)	6.5	7.1	6.9	7.0	6.95	7.2	6.3	
Specific Conductance (umhos/cm)	375	900	310	325	1300	975	360	
Temperature (^{o}c)	10.0	6.5	9.0	9.5	12.0	12.0	15.0	
Static Water Level (proj. datum)	99.88	91.91	92.39	98.27	91.66	88.55	90.48	
Bicarbonate	190	640	180	200	1000	770	250	<2
Alkalinity	160	540	160	170	880	620	182	<2
Chloride	7.2	12	<7	<7	30	53	11	<7
Sulfate	<1	<1	<1	<1	<1	<1	<1	<1
Phenols, Total (ug/l)	10.4	5.0	6.4	<5.0	51.6	N.D.	8	<5.0
Iron, Dissolved	1.7	1.6	7.8	2.4	23	0.38	6.9	<0.05
Copper, Dissolved	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.030	<0.02
Lead, Dissolved	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Zinc, Dissolved	0.037	0.057	0.023	0.030	0.023	0.037	0.067	<0.020
Calcium, Dissolved	38	120	28	43	200	93	44	0.077
Sodium, Dissolved	3.0	7.2	1.4	1.3	22	13	7.4	0.14
Magnesium, Dissolved	15	42	18	9.6	63	58	18	0.042
Manganese, Dissolved	0.22	0.52	0.12	0.18	1.7	1.5	1.0	<0.02
Total Organic Carbon	38	40	40	20	56	26	38	<5
Cation Exchange Capacity (CED)	3.10	3.52	2.11	0.81	5.49	5.03	N.D.	N.D.

*All Results expressed as mg/l unless noted.

in areas where residue has not been applied and other logs indicated the presence of clay-like material at the interface between the soil and bedrock. Table 2 summarizes the soil sampling results. The data and calculation sheets for the field permeabilities and sieve analyses are provided in Appendix A. A discussion of the procedure for field permeability is also included in Appendix A.

All soil borings were continued to refusal which was assumed to be bedrock. Bedrock was encountered at depths ranging from 5 feet to 20 feet below the undisturbed ground elevation. This corresponds to a range of bedrock elevations between 80 feet and 90 feet project datum. The highest bedrock elevations were encountered near the center of the active portion of the site. Overall, it appears that the bedrock surface is at shallow depths and undulates somewhat, but dips in a general southerly direction. This is consistent with the report entitled "Reconnaissance of the Groundwater Resources of Schoolcraft County, Michigan", U. S. Geological Survey, 1959. Domestic water well logs obtained from the Michigan Department of Public Health within the general area also show that bedrock is encountered from as little as 3 feet to as much as 30 feet below the ground surface, which is consistent with the findings of this study. These logs also indicate that the water producing formation is encountered most often in the fractured limestone between 50 and 100 feet below the ground surface. Well logs for the area also show the presence of a layer of hard crystalline rock about 10 to 15' thick occurring between the fractured limestone near the ground surface and the deeper fractured limestone which serves as the water bearing formation.

GROUNDWATER OCCURRENCE AND QUALITY:

DATA COLLECTION PROCEDURES

In accordance with the approved work study plan, seven groundwater observation wells were constructed, water surface elevations were determined to establish the hydraulic gradient and direction of groundwater flow and groundwater samples were collected and analyzed. The parameters tested were: pH, specific conductance, temperature, static water level, bicarbonate, alkalinity, chloride, sulfate, phenols, iron, copper, lead, zinc, calcium, sodium, magnesium, manganese and total organic carbon.

Six of the seven groundwater observation wells were constructed during January 1987 in conjunction with soil boring activities. Wells were constructed in accordance with the typical well construction procedure which is illustrated in Figure 4. Screens were installed in all wells at depths as shown on the soil boring logs (Appendix B). Well number seven was installed in July 1987 to provide additional information on the water surface elevation and water quality in a downgradient direction from the site.

The effects of precipitation on this site were observed directly in early June of 1987. A rainfall in excess of 1.5 inches occurring on June 6, 1987 resulted in an increase in water surface elevations of approximately 0.3' between June 5, 1987 and June 8, 1987. This suggests that groundwater movement through the site is quite slow and that the Gould's Slough area of the Manistique River controls the rate of flow of groundwater from the site. This also indicates that groundwater levels in the area fluctuate in direct response to the effects of precipitation and therefore behaves as an unconfined aquifer.

Water surface elevations were measured on 4 separate occasions from

February 1987 through July 1987. These measurements show that during the study period there was a variation of approximately 1.2 to 1.5 feet in the water surface elevations, which is to be expected in an unconfined aquifer. It was also observed that the variation in elevations is quite constant throughout the site, indicating that the water surface of the entire site is hydraulically connected. Since the water in some of the wells was frozen when measurements were made in February 1987, this information was not utilized in determining the direction of groundwater flow.

The water surface elevations can be used to estimate the direction of groundwater flow through this site by analyzing a group of three wells. Although only 3 wells are necessary to estimate the flow direction, a total of seven wells were available for analysis. Therefore, it was possible to analyze multiple well groupings to provide a high degree of confidence in the results. A total of three well groupings were analyzed. Well numbers W-1, W-4 and W-5 and well numbers W-3, W-6 and W-5 were analyzed with information obtained on June 8, 1987. Well numbers W-1, W-4 and W-7 were analyzed with information obtained on July 17, 1987.

A comparison of these separate analyses establishes a general groundwater flow direction for the site of north to slightly northeast (See Figure 2). Due to the close proximity of the Manistique River and Gould's Slough to the north limits of the site, it is likely that groundwater from this site is discharging to the downstream portion of Gould's Slough (Creek) just upstream from its confluence with the Manistique River. Graphical determinations of the groundwater flow are included in Figure 2. The abandoned Haywire Railroad grade situated between the site and Gould's Slough restricts the flow somewhat and diverts it towards drainage ways beneath the grade. This is illustrated in Figure 2. This does not interfere with the general groundwater flow or its point of discharge.

The groundwater examined during this study occurs in a saturated zone between the bedrock and a few feet below the ground surface. This groundwater is not considered a useable aquifer since Rule 325.1631(4) of the Michigan Department of Public Health well construction code requires that at least 25 feet of casing be installed in the construction of domestic water supplies. This requirement results in all wells in the immediate area being completed in the underlying bedrock, in most cases to depths greater than 50 feet.

The horizontal rate of groundwater flow can be estimated by the expression:

$$V = \frac{Ki}{n}$$

where V = groundwater flow velocity (cm/sec)
K = hydraulic conductivity
i = hydraulic gradient
n = porosity

The hydraulic conductivity based on field determinations of permeability ranges from 1.03×10^{-2} cm/sec to 1.70×10^{-3} cm/sec with an average value of 4.65×10^{-3} cm/sec. The hydraulic gradient ranges from .005 ft./ft. to .003 ft./ft. An average of .004 will be used in this case. The porosity is assumed to be 0.35 which is representative of medium sands which constitutes the majority of the saturated soil zone in this case. Using this expression and the values for this site, the estimated horizontal velocity is 55 ft./year.

WATER QUALITY

Samples for wells 1 through 6 were collected on June 8, 1987 and well number 7 was sampled on July 17th. Results are shown in Table 3. Prior to sampling, all wells were bailed with a teflon bailer to remove at least 3 volumes of water or until the well was emptied. Samples were collected with a teflon bailer and transferred to containers that were prepared by the laboratory. Preservatives were also added by the laboratory as necessary. Samples for dissolved metals were filtered in the field with a 45 micron filter before being transferred to the sample bottles containing preservatives.

Measurements of static water elevation, temperature, pH and conductivity were performed at the time of sampling. All other samples were submitted to Western Michigan Environmental Services in Holland, Michigan for analyses. A copy of the laboratory report for these samples is included in Appendix D.

Well number 4 appears to be the upgradient well for the group of 7 wells installed for this study. It had the highest static water elevation during all sampling events and it is felt that this well is most representative of upgradient water quality in the area. Wells number 6 and 7 are located at the north and northeast extreme of the site and would be expected to be in the direct path of groundwater flowing from the site toward Gould's Slough and the Manistique River, based on static water elevations. The concentrations of all parameters in the 7 wells tested are below primary Federal Drinking Water Standards (See Table 3). Data from the upgradient well (#4) shows that the naturally occurring groundwater in this area is enriched with iron and manganese to levels exceeding secondary Federal Drinking Water Standards, which is quite common throughout Michigan. The remaining wells also show iron and manganese exceeding secondary standards. Iron and manganese at these levels do not pose any threat to human health and these constituents are considered of secondary importance from the standpoint of Drinking Water Standards. The typical problem associated with iron and manganese at these levels is that staining of plumbing fixtures can be expected. In any event, as discussed earlier, this aquifer is considered unsuitable for the installation of domestic water wells because of casing requirements of the well construction code.

There are some other important observations concerning the sampling of the groundwater in the area. Well number 5 is located within a short distance of where residuals are being applied, and shows the highest concentrations of nearly all parameters. Wells number 6 and 7, located a short distance downgradient from well number 5, 900 feet and 500 feet, respectively, show much lower concentrations of most parameters a short distance from the site. This result indicates that the constituents in the residual materials are relatively immobile and non-reactive and that the groundwater quality recovers within a few hundred feet. The natural processes of decomposition, attenuation and dilution are important processes responsible for improvements in water quality. Wells number 1 and 2 are also located near an area that has received residuals and near areas that have been covered and revegetated. These wells do not show significantly elevated levels of parameters. This suggests that the current method of covering and revegetating the site successfully reduces the mobility of the materials from the site.

In summary, the current operation has no adverse impact on the groundwater in close proximity to the site. Based on the groundwater quality within a few hundred feet of the site, groundwater from this area should be of very good quality by the time it discharges to Gould's Slough. At the estimated horizontal velocity of 55 feet per year, estimated time of travel from the northern boundary of this site to Gould's Slough is 36 years.

WASTE CHARACTERIZATION:

It is estimated that the site currently contains approximately 750,000 cubic yards of residuals. This waste is predominantly dewatered sludge from the paper mill's secondary wastewater treatment plant (665,000 yds) plus ash (78,000 yds) from the mill's power production facilities. The remainder of the material (<1%) is comprised of miscellaneous fiber wastes such as cores, crating material, scrap paper, etc. which are incidental to the paper manufacturing process. Domestic refuse is collected by a commercial hauler and transported to the Manistique City Landfill.

To obtain information on the nature of the residuals previously placed in the site, that samples were obtained from borings into the existing residuals, in accordance with the Michigan Department of Natural Resource's approved work study plan. Borings B, K, L, M, J, G & H were completed in this material and in all cases extended into the native soils beneath the site. Boring depths ranged from 5 to 47 feet. Boring locations are shown in Figure 2. Appendix B contains the boring logs. The boring logs give visual descriptions of the material that was found throughout the profile. Composite samples from borings G, J. K, L & M were submitted to the laboratory for ASTM leachate analyses. In accordance with the work study plan, these samples were analyzed for: pH, specific conductance, oil and grease, phenols, aluminum, cadmium, chromium, copper, iron, lead, zinc, PCB's, manganese, total organic carbon and total solids. Results from this testing are included in Table 4 and laboratory reports are included as Appendix C and F.

Even though the material sampled was placed in the site over a long period of time (approximately 14 years), the quality of the leachate shows

MANISTIQUE PAPERS, INC.
HYDROGEOLOGICAL STUDY
TABLE 4
RESULTS OF ASTM LEACHATE ANALYSES

PARAMETER	SAMPLE SOURCE: BORING G	BORING J	BORING K	BORING L	BORING M	DEWATERED SLUDGE	ASH SAMPLE
All results expressed as mg/l unless noted.							
pH (S. U.)	7.5	7.4	6.6	7.4	7.4	7.4	9.7
Specific Conductance (umhos/cm)	140	55	300	100	140	350	300
Oil & Grease	<1	<1	<1	<1	<1	7	<3
Phenols, Total	0.006	0.010	0.011	0.054	0.069	0.190	<0.005
Aluminum, Total	<0.25	<0.25	<0.25	<0.025	<0.25	<0.025	1.8
Cadmium, Total	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chromium, Total	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Copper, Dissolved	<0.02	0.029	0.029	<0.02	0.029	<0.02	<0.02
Iron, Dissolved	0.15	0.099	0.32	<0.05	<0.05	<0.05	<0.05
Lead, Dissolved	<0.005	0.019	0.0076	<0.005	<0.005	<0.005	<0.005
Zinc, Dissolved	0.041	0.055	17	0.14	0.27	0.13	<0.002
PCB's (ug/l)	<0.5	<0.5	<0.5	<0.5	<0.05	<0.1	<1.0
Manganese	N.T.	N.T.	0.066	<0.02	0.028	0.056	<0.02
Total Organic Carbon	N.T.	N.T.	57	44	19	60	<5
Total Solids (%)	71.6	40.2	48.2	38.3	42.4	38.9	97.5

NOTE: N.T. means a test was not performed.

there are no significant differences in the leaching characteristics of the residuals during this time period. The only change in mill processes during the period the site has been in operation is the discontinuation of the groundwood mill in 1985. This had no impact on the primary sources of residuals.

Comparing the results of the leachate tests from samples of the material at various locations at the site, all sample results fall within primary Federal Drinking Water Standards, and within secondary Federal Drinking Water Standards for all samples except boring K. The sample from boring K had a dissolved iron concentration of 0.32 mg/l compared to the secondary standard of 0.3 mg/l. These values are essentially equal with the small difference being within the limits of accuracy for sampling and analysis. As pointed out in the section "Groundwater Occurrence and Quality", observation wells have background groundwater concentrations of iron which are significantly greater than this secondary drinking water standard. The leachate from this same boring also showed a zinc concentration of 17 mg/l which is greater than the 5 mg/l secondary drinking water standard for zinc. Human consumption of waters containing zinc at concentrations of up to 47 mg/l has been reported without health effects and this concentration is not considered significant. All other values for zinc are in the range of 0.041 mg/l to 0.27 mg/l which is far less than the secondary drinking water standard. Based on the fact that there is no appreciable difference in leachate characteristics between material that was placed at this site in the early stages of operation (Borings G and J) and material that has been placed in more recent years (Borings K, L & M), it can be concluded that the material is very stable from a chemical, biological and physical standpoint. It can also be concluded that the previously placed material meets the definition of inert as contained in the Michigan Department of Natural Resource's "Solid Waste Designation Guideline", February, 1987, and is therefore suitable for placement in this site.

CURRENT AND FUTURE SITUATION:

No significant changes in the character of the residuals produced at the paper mill are currently expected within the next several years. It is anticipated that increases in paper production will continue to be achieved as design conditions for the recent paper machine upgrading are achieved. This would result in slight increases in dewatered sludge volumes, but the quality and composition of the sludge should not change.

It is therefore expected that 99% of the residuals taken to the site will continue to consist of dewatered sludge and power plant ash. The current makeup of material is estimated to be 94,000 yd^3 of dewatered sludge, 11,000 yd^3 of ash and 1,000 yd^3 of primarily demolition type material.

Samples of ASTM leachate from the dewatered sludge and ash were analyzed for parameters agreed upon in the work study plan. Laboratory reports are included in Appendix E and F.

A comparison of these leachate results (listed in Table 4) indicates that the characteristics of the dewatered sludge are very similar to the characteristics of the previously placed material. This is expected on the basis that there have been no significant changes in the residuals placed in the site, as discussed earlier. The ash sample shows non-detectable levels of all parameters but aluminum. It can therefore be concluded that the materials currently being placed in the site meet the definition of inert as contained in the Michigan Department of Natural Resource's "Solid Waste Designation

Guideline", February, 1987.

SUMMARY:

A review of leachate produced from samples of previously placed material and from the material currently being placed shows that all material investigated is suitable for placement at this site, because it meets the definition of inert material as contained in applicable guidelines. Residuals, with characteristics similar to residuals generated currently and in the expected future, have been placed at this site for approximately 15 years without creating any adverse environmental impacts.

APPENDIX A

PROCEDURE FOR FIELD DETERMINATION OF MONITORING WELL PERMEABILITY:

In place permeabilities were determined on well numbers 1, 3 and 4 by the slug test method. This methods involves instantaneously adding a known volume of water, or slug of water to a well. The rate at which the column of water falls to the original level is controlled by the formation characteristics.

To calculate the horizontal permeability, Horslev[1] has developed an equation for a cased hole in an aquifer of finite thickness:

$$K = \frac{r^2 \ln(L/R)}{2LT_0}$$

where K is the permeability, r is well diameter, L is the length of screen, R is the screen diameter, and T_0 is the time required for equalization of the head difference if the original rate of inflow or outflow is maintained.

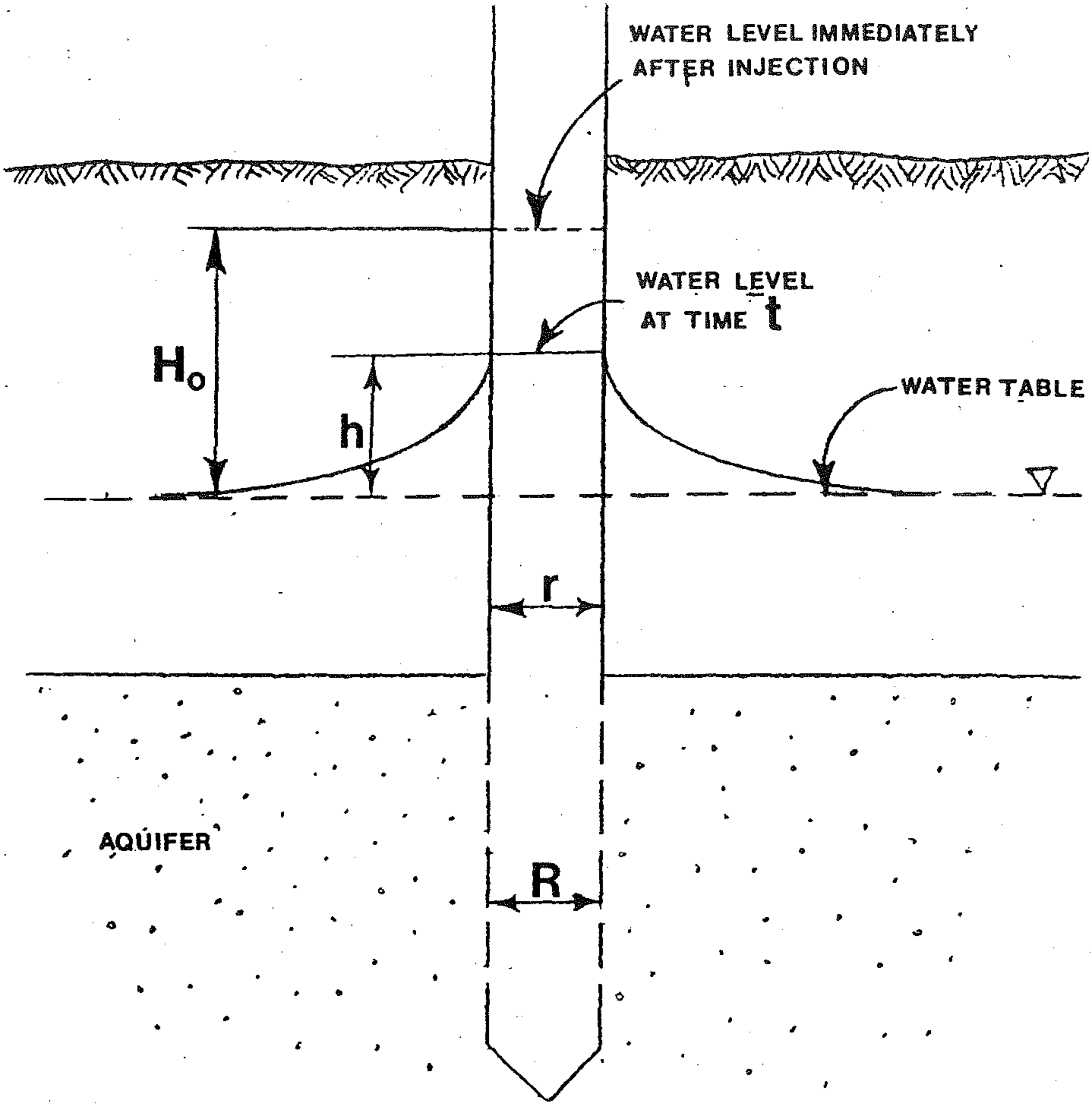
Immediately after injection, the water level in the well has an initial elevation, H_0 above the initial static water level. As the water level falls, the difference h in the water level between that at time t and that at the original head is measured. See Figure 4. The log of the ratio of the water level at any time, divided by the water level immediately after injection, h/H_0, is plotted versus time. This plot will yield a straight line. Horslev determined that when h/H_0 is equal to 0.37, the time t is equal to T_0.

The slug test consisted of initially measuring the static level in the monitoring well. An airline was inserted in the well until just submersed. A portable pump supplied the pressure and a pressure transducer was used to convert psi into feet of water above the bottom of the air line. A volume of water was injected into the well and the initial displacement, H_0, was recorded. The drop of the column of water was recorded versus time.

[1] Cedergren, Seepage, Drainage and Flow Nets, 2nd Edition, John Wiley and Sons, 1977, Page 66.

The plot of the log (h/H_o) versus time is in the attached sheets for each well. Since the air line was submersed before injection of the column of water, the ratio h/H_o must be corrected for the initial level of water above the line. Thus, the original depth, H must be subtracted. This gives a plot of $\frac{h - H}{H_o - H}$ versus t on semi-log graph paper.

Where $\frac{h - H}{H_o - H}$ is equal to 0.37, t is equal to T_o.



DRAWN	**WELL PERMEABILITY SLUG TEST**	
CHECKED		
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[illegible]	U.P. ENGINEERING AND ARCHITECTURAL ASSOCIATES, INC.	
FILE NO.	322 SHELDEN AVE. HOUGHTON MICHIGAN 49931 PHONE 906-482-4810 BRANCH OFFICE at NORWAY, MICHIGAN 49870 PHONE 906-563-5407	Job No.

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HOUGHTON NORWAY ESCANABA

WELL PERMEABILITY - SLUG METHOD 6' 10"

CLIENT: Manistique Papers DATE: 2-11-87

TEST PERSONNEL: WJM LAV PROJECT #: 87107

WELL NO.: 1 WELL DEPTH: 12 ft WELL DIAMETER(r): 2 inch

SCREEN LENGTH(L): 2 ft SCREEN DIAMETER(R): 2 inch

ORIGINAL H: 0.35 $K = \frac{r^2 \ln(L/R)}{2LT_o}$

DISPLACEMENT t(min.)	DISPLACEMENT depth(ft.)	RECOVERY t(min.)	RECOVERY depth(ft.)
~~0.25~~ 0 H_o =	2.90	0.25	
~~0.5~~ 0.25	1.72	0.5	
~~1.0~~ 0.75	1.03	1.0	
~~1.5~~ 1.25	0.72	1.5	
~~2.0~~ 1.75	0.59	2.0	
~~2.5~~ 2.25	0.51	2.5	
~~3.0~~ 2.75	0.47	3.0	
~~4.0~~ 3.75	0.41	4.0	
~~5.0~~ 4.75	0.38	5.0	
~~6.0~~ 5.75	0.36	6.0	
~~7.0~~ 6.75	0.35	7.0	
~~8.0~~ 7.75		8.0	
~~10.0~~ 9.75		10.0	
12.0		12.0	
14.0		14.0	
16.0		16.0	
18.0		18.0	
20.0		20.0	

HOUGHTON NORWAY ESCANABA

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BRANCH OFFICES at NORWAY, MICHIGAN 906-563-5407 and at ESCANABA, MICHIGAN 906-786-8881

CALCULATION SHEET

Computed by WJM	Subject SLUG TEST	Sheet 1 of
Checked by		Job. No. 87107
	Client MANISTIQUE PAPERS	Date 2-12-87

WELL # 1

$\frac{H-h}{H-H_o}$ where $H = 0.35$
h = depth at t
$H_o = 2.90$

$t = 0.25$

$$\frac{0.35 - 1.72}{0.35 - 2.90} = 0.54$$

$t = 0.75$

$$\frac{0.35 - 1.03}{0.35 - 2.90} = 0.27$$

t	$\frac{H-h}{H-H_o}$
0.25	0.54
0.75	0.27
1.25	0.15
1.75	0.09
2.25	0.06
2.75	0.05
3.75	0.02
4.75	0.01

When $\frac{H-h}{H-H_o} = 0.37$, $t = T_o$

T_o = 51 sec from graph

$$K = \frac{r^2 \ln\left(\frac{L}{R}\right)}{2 L T_o}$$

$r = 2'' \times 2.54\ cm/in = 5.08\ cm$

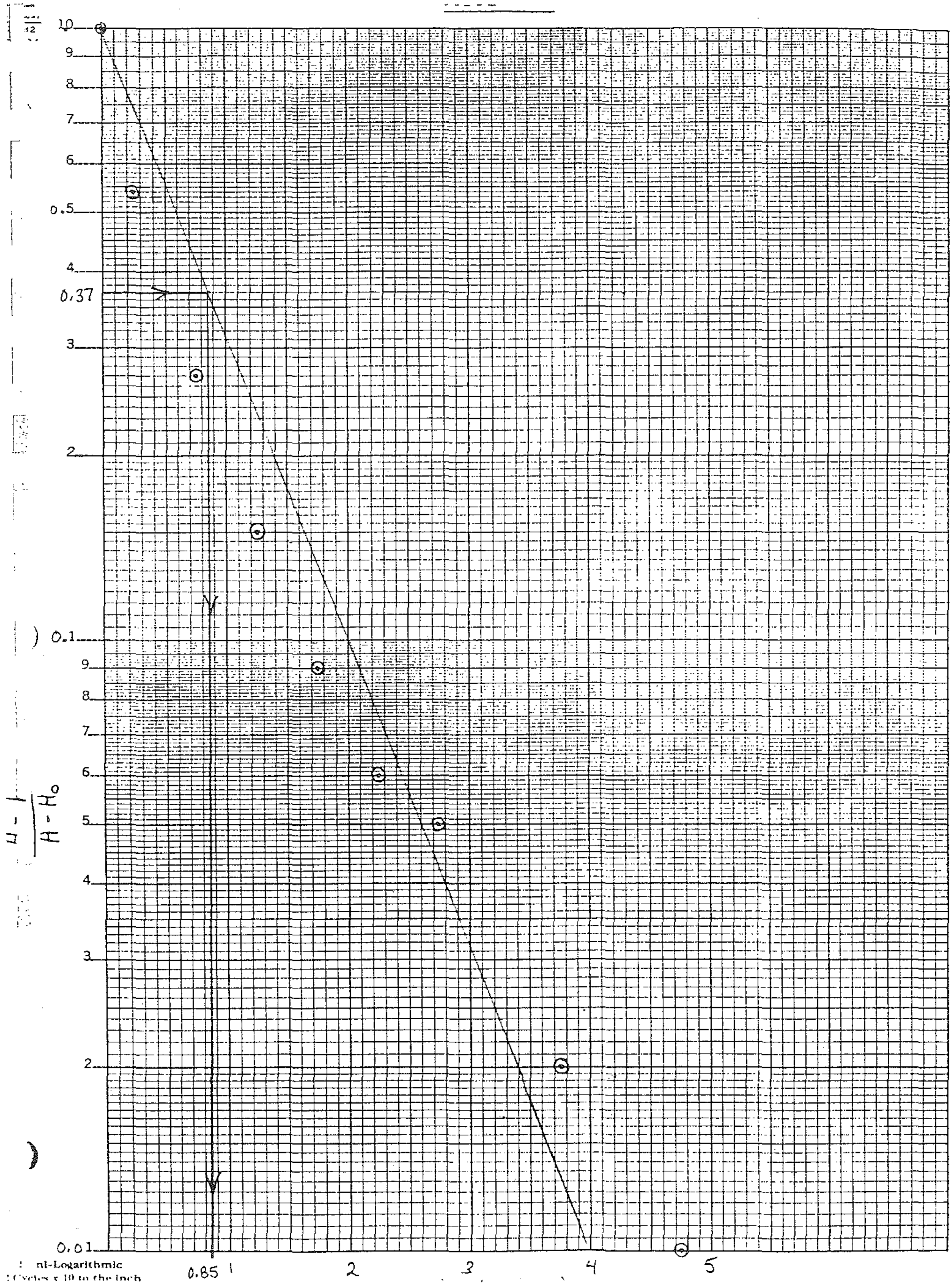
$L = 24'' \times 2.54 = 60.96\ cm$

$R = 2'' \times 2.54\ cm/in$ 5.08 cm

$$= \frac{(5.08)^2 \ln\left(\frac{60.96}{5.08}\right)}{2(60.96)(51 sec)}$$

$= 1.03 \times 10^{-2}$ cm/sec = 8.9 m/day

Med to Coarse sand



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nl-Logarithmic
Cycles x 10 to the Inch

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WELL PERMEABILITY - SLUG METHOD STATIC = 5' 5"

CLIENT Manistique Papers Inc DATE 2-11-87

TEST PERSONNEL WJM LAV PROJECT # 87107

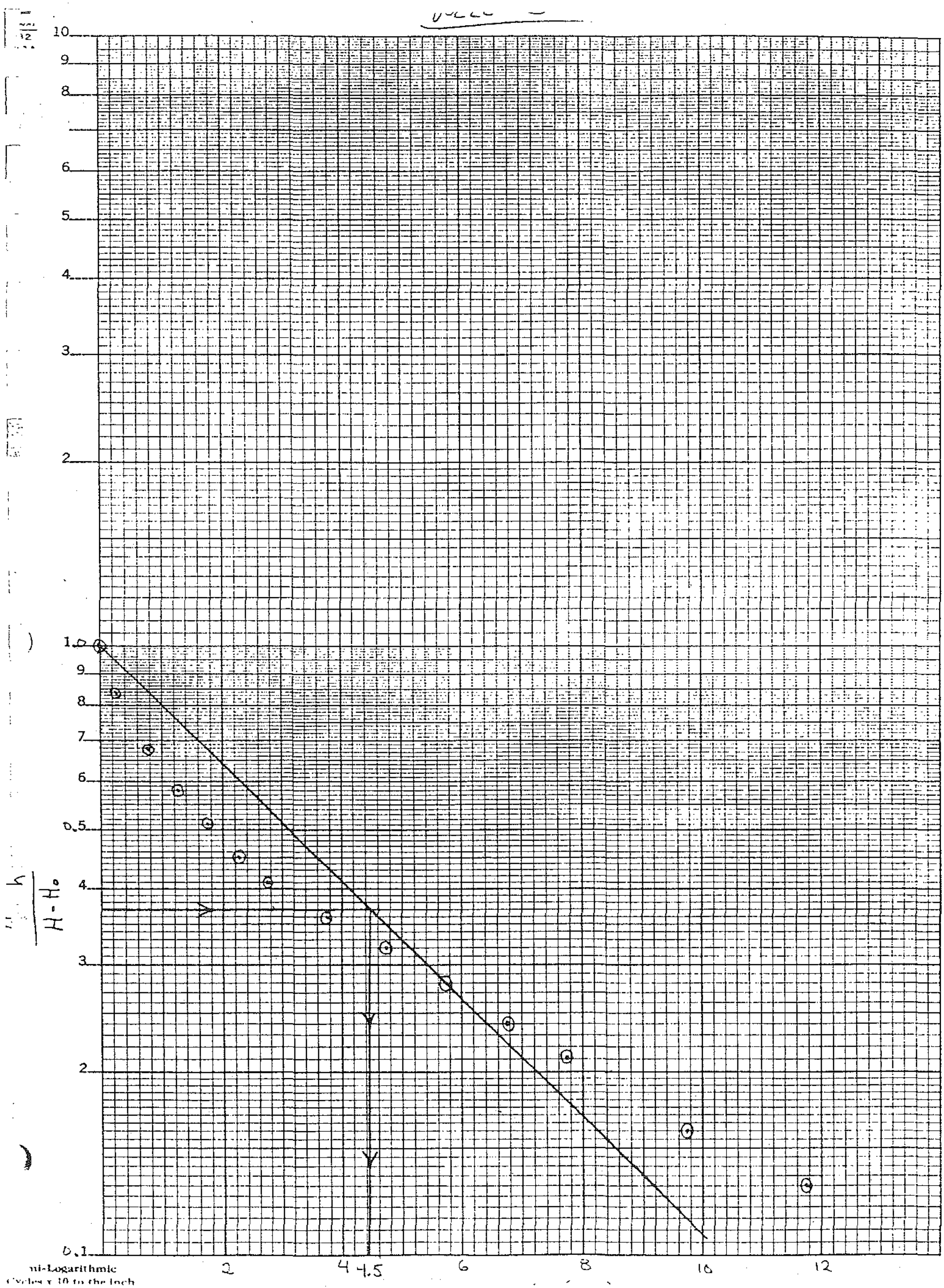
WELL NO. 3 WELL DEPTH 8 ft WELL DIAMETER(r) 2 inch

SCREEN LENGTH(L) 2 ft SCREEN DIAMETER(R) 2 inch

ORIGINAL H 0.30

$$K = \frac{r^2 \ln(L/R)}{2LT_O}$$

DISPLACEMENT			RECOVERY	
t(min.)	depth(ft.)		t(min.)	depth(ft.)
0.25	4.81		0.25	
0.5	4.10	0.84	0.5	
1.0	3.36	0.68	1.0	
1.5	2.90	0.58	1.5	
2.0	2.59	0.51	2.0	
2.5	2.34	0.45	2.5	
3.0	2.16	0.41	3.0	
4.0	1.93	0.36	4.0	
5.0	1.73	0.32	5.0	
6.0	1.55	0.28	6.0	
7.0	1.40	0.24	7.0	
8.0	1.26	0.21	8.0	
10.0	1.04	0.16	10.0	
12.0	0.88	0.13	12.0	
14.0	0.75	0.10	14.0	
16.0	0.65	0.08	16.0	
18.0	0.58	0.06	18.0	
20.0	0.51		20.0	



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STATIC = 5' 4"

WELL PERMEABILITY - SLUG METHOD

CLIENT: MANISTIQUE PAPERS INC. DATE: 2-11-87

TEST PERSONNEL: WJM LAV PROJECT #: 87107

WELL NO.: 4 WELL DEPTH: 12' ft WELL DIAMETER(r): 2 INCH

SCREEN LENGTH(L): 2 ft SCREEN DIAMETER(R): 2 INCH

ORIGINAL H: 0.39 $K = \frac{r^2 \ln(L/R)}{2LT_o}$

DISPLACEMENT t(min.)	DISPLACEMENT depth(ft.)		RECOVERY t(min.)	RECOVERY depth(ft.)
0.25	4.46		0.25	
0.5	4.18	0.93	0.5	
1.0	3.77	0.83	1.0	
1.5	3.38	0.73	1.5	
2.0	3.06	0.66	2.0	
2.5	2.78	0.59	2.5	
3.0	2.55	0.53	3.0	
4.0	2.20	0.44	4.0	
5.0	1.95	0.38	5.0	
6.0	1.75	0.33	6.0	
7.0	1.57	0.29	7.0	
8.0	1.42	0.25	8.0	
10.0	1.17	0.19	10.0	
12.0	0.99	0.15	12.0	
14.0	0.86	0.12	14.0	
16.0	0.75	0.09	16.0	
18.0	0.67	0.07	18.0	
20.0	0.62	0.06	20.0	

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CALCULATION SHEET

Computed by ______ Subject ______ Sheet ____ of ____

Checked by ______ ______ Job. No. ______

Client ______ Date ______

Well #4

$$K = \frac{r^2 \ln\left(\frac{L}{R}\right)}{2\,L\,T_0}$$

r = 2 INCH × 2.54 cm/in = 5.08 cm

L = 24 INCH × 2.54 = 60.96 cm

R = 2 INCH × 2.54 = 5.08 cm

T_0 = 309 sec

$$= \frac{(5.08)^2 \ln\left(\frac{60.96}{5.08}\right)}{2(60.96)(309)}$$

$$= 1.70 \times 10^{-3} \text{ cm/sec} \quad = \quad 1.5 \text{ m/day}$$

MED SAND

WELL # 3

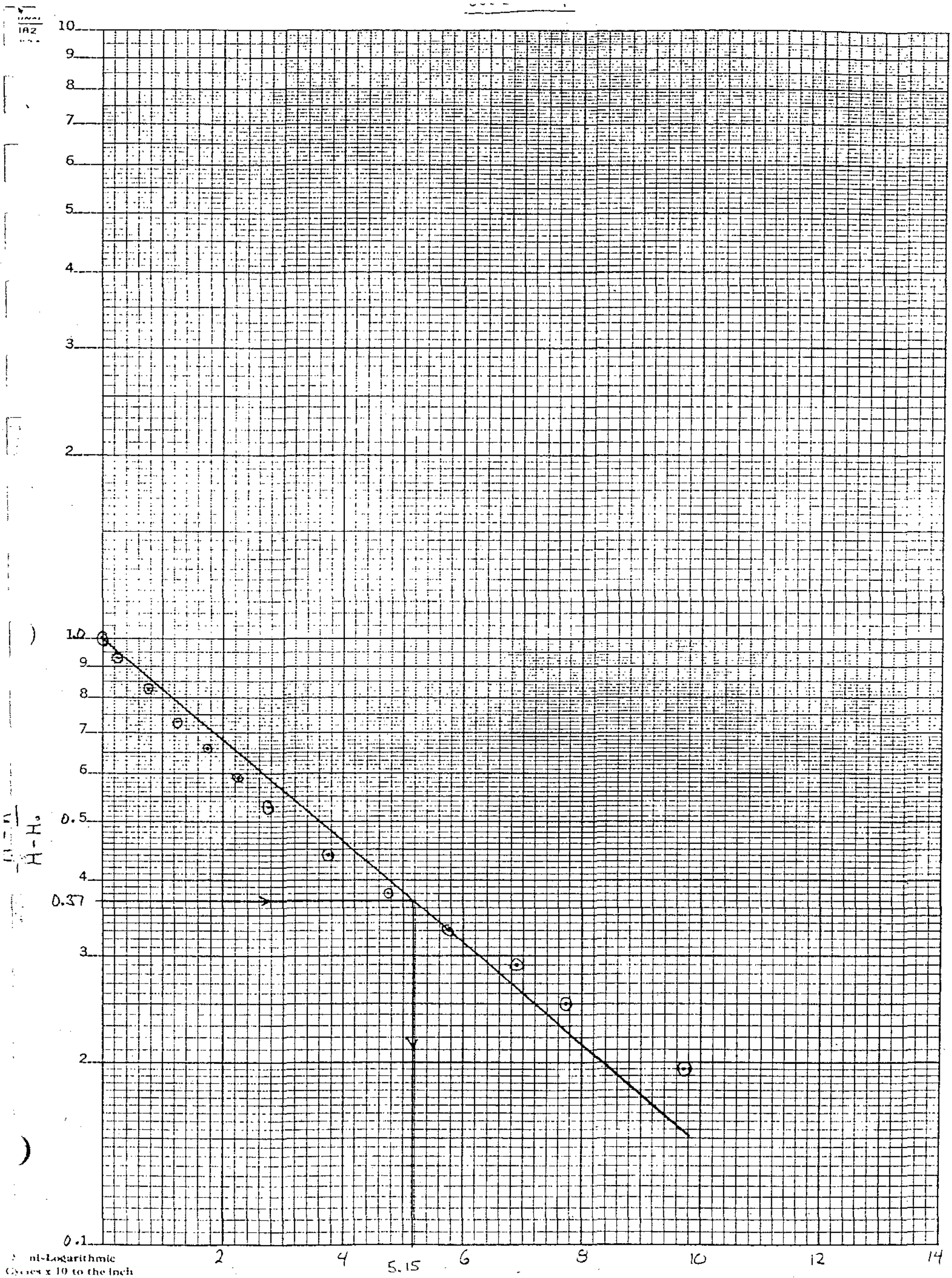
$$K = \frac{r^2 \ln\left(\frac{L}{R}\right)}{2L\,T_0}$$

T_0, FROM GRAPH, = 270 sec

$$= \frac{(5.08)^2 \ln\left(\frac{60.96}{5.08}\right)}{2(60.96)(270\text{sec})}$$

$$= 1.95 \times 10^{-3} \text{ cm/sec} \quad = \quad 1.7 \text{ m/day}$$

Med. SAND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Cycles x 10 to the Inch

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HOUGHTON NORWAY ESCANABA

WELL PERMEABILITY - SLUG METHOD

STATIC LEVEL 2' 8"

CLIENT MANISTIQUE PAPERS INC. DATE 2-11-87

TEST PERSONNEL WJM LAU PROJECT # 87107

WELL NO. 6 WELL DEPTH 3.5 ft WELL DIAMETER(r) 2 INCH

SCREEN LENGTH(L) 2 ft SCREEN DIAMETER(R) 2 INCH

ORIGINAL H 0.39 $K = \frac{r^2 \ln(L/R)}{2LT_o}$

DISPLACEMENT t(min.)		DISPLACEMENT depth(ft.)	RECOVERY t(min.)	RECOVERY depth(ft.)
~~0.25~~	H_o =	1.79	0.25	
0.5	0.25	1.81	0.5	
1.0	0.75	1.81	1.0	
1.5	1.25	1.81	1.5	
2.0	H_o =	1.81	2.0	
2.5	0.5	1.77	2.5	
3.0	1	1.77	3.0	
4.0	2	1.76	4.0	
5.0	3	1.73	5.0	
6.0	4	1.73	6.0	
7.0	5	1.73	7.0	
8.0	6	1.72	8.0	
10.0	8	1.72	10.0	
12.0	10	1.67	12.0	
14.0	12	1.61	14.0	
16.0	14	1.56	16.0	
18.0	16	1.52	18.0	
20.0	18	1.48	20.0	

U.P. ENGINEERING AND ARCHITECTURAL ASSOCIATES, INC.

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BRANCH OFFICES at NORWAY, MICHIGAN 906-563-5407 and at ESCANABA, MICHIGAN 906-786-8881

CALCULATION SHEET

Computed by WJM	Subject SLUG - TEST	Sheet 2 of
Checked by		Job. No. 87107
	Client MANISTIQUE PAPERS	Date 2-12-87

WELL # 6

$\frac{H-h}{H-H_o}$ where $H = 0.39$
$h =$ depth at time, t
$H_o = 1.81$

t = 0.5
$\frac{0.39 - 1.77}{0.39 - 1.81} = 0.97$

t = 1.0
$\frac{0.39 - 1.77}{0.39 - 1.81} = 0.97$

t	$\frac{H-h}{H-H_o}$
0.5	0.97
1	0.97
2	0.96
3	0.94
4	"
5	"
6	"
8	"
10	0.90
12	0.86
14	0.82
16	0.80
18	0.77

MAR 17 1987

U.P. ENGINEERING AND ARCHITECTURAL ASSOCIATES, Inc.
611 MAIN STREET, NORWAY, MI 49870 • (906) 563-5407

March 16, 1987

Mr. Bill Meinz
U.P. Engineering
614 Ludington Street
Escanaba, Michigan 49829

RE: MANISTIQUE PAPER
PERMEABILITY TESTS

Dear Bill:

As per our conversation of March 13, 1987, concerning the tests run for the above referenced project, I am enclosing my method for recreating the in-place density in the constant head permeability test.

Step 1. Weigh sample and sample mold (W_1).
Step 2. Calculate volume of mold (V_m).
$V_m = \pi r^2 h$
Step 3. Calculate volume of sample V_s).
$V_s = \pi r^2 h$
Step 4. Remove sample from sample mold.
Step 5. Weigh sample mold (W_{sm}).
Step 6. Calculate weight of sample (W_s).
$(W_1 - W_{sm}) = W_s$
Step 7. Calculate the weight/c.f. of sample based on the volume of the sample.
$W_s/V_s = A(lbs)/CF$

Knowing 'A' lbs/cf of the sample and knowing the volume of the constant head permeability mold, 1/30th of a cubic foot (B), calculate the weight (W_p) of the soil needed in mold (W_x).

$W_x = A(\#/CF)/B(CF)$

Therefore, W_x has to be compacted in the length (L) of the permeability mold.

The last step is a trial and error function to match (W_x) with (L). This is done by repeating the compaction of the soil sample in the mold. Keeping in mind that this should be done in a timely fashion as to not change the moisture content of the soil sample.

Mr. Bill Meinz
U.P. Engineering
Page 2

You should also note that the constant head for these tests is 863 cm (28.31 ft.) which may or may not simulate the actual field head on the soil sample.

Should you have any further questions or comments, feel free to contact me.

Sincerely,

Timothy J. Klenow
Certified Engineering Technician

U. P. Engineering and
Architectural Associates, Inc.

TJK:nh

U.P. ENGINEERING AND ARCHITECTURAL ASSOCIATES, Inc.

CONSTANT HEAD PERMEABILITY TEST

Description of soil PAPER MILL SLUDGE

Sample No. 1 BORING 'G' Location 1' to 2'

Length of specimen, L 11.43 (cm) Diameter of specimen, D 10.16 (cm)

Area of specimen, A 81.07 (cm^2) Dry weight of specimen, $W_2 - W_1$ ______ g

Void ratio, e ______ G_s ______

	Test No.	Average flow, Q (cm^3)	Time of collection, t (sec)	Temperature of water, T (°C)	Head difference, h (cm)	$k = \frac{QL}{Aht}$ (cm/sec)	
3/6/87	11:50 AM 1:50 pm	122	7,200	14°(C) 1.162	863	3.2167×10^{-6}	
	1:50 pm 3:50 pm	111	7,200	14°(C) 1.162	863	~~2.519×10^{-6}~~	
	3:50 pm 8:30 pm	250	~~15,600~~ 16,800	14°C 1.162	863	~~2.618×10^{-6}~~	2.825
3/7	8:30 pm 6:35 AM	535	36,300	8°(C) 1.38	863	3.3228×10^{-6}	
	6:35 AM 12:50 PM	340	22,500	17°C 1.075	863	2.654×10^{-6}	
	12:50 pm 7:15 pm	398	23,100	11°C 1.265	863	~~2.815×10^{-6}~~	3.56
3/8	7:15 pm 6:50 AM	765	41,700	8°C 1.38	863	4.1360×10^{-6}	
					AVE =	3.236×10^{-6}	

$$Y = \frac{L}{Ah} = 0.000163371$$

$$\therefore \frac{(1.63371 \times 10^{-4})\, Q}{t} \quad \therefore \; k = (Y)\left(\frac{Q}{t}\right)$$

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MAIN STREET NORWAY, MI 49870

CONSTANT HEAD PERMEABILITY TEST

Description of soil: PAPER MILL Sludge

Sample No.: 4 Boring 'J' Location: 8'-9.5'

Length of specimen, L: 11.43 (cm) Diameter of specimen, D: 10.16 (cm)

Area of specimen, A: 81.07 (cm^2) Dry weight of specimen, $W_2 - W_1$: ______ g

Void ratio, e: ______ G_s: ______

	Test No.	Average flow, Q (cm^3)	Time of collection, t (sec)	Temperature of water, T (°C)	Head difference, h (cm)	$k = \frac{QL}{Aht}$ × Temp corr (cm/sec)
1/1/87	12:10 pm 2:30	450	8,400	7° 1.13 chart	863	1.2515×10^{-5}
	2:30 4:45	360	8,100	7° 1.43	863	1.0383×10^{-5}
	4:45 7:40 pm	460	10,500	7° 1.43	863	1.023×10^{-5}
3-1-2	7:40 pm 6:50 Am	1971	40,200	5° 1.52	863	1.317×10^{-5}
	6:50 Am 8:30 Am	340	6,000	6° 1.47	863	1.361×10^{-5}

*AVG = 1.1598×10^{-5}

$$k = Y\left(\frac{Q}{t}\right)$$

$$Y = \frac{L}{Ah} = \frac{11.43}{81.07 \times 863}$$

* minus 1st reading

3-9-87
T. J. K.

U.P. ENGINEERING AND ARCHITECTURAL ASSOCIATES, Inc.
611 MAIN STREET NORWAY, MI 49870

CONSTANT HEAD PERMEABILITY TEST

Description of soil PAPERMILL SLUDGE

Sample No. (2) Boring 'K' Location 13'–15'

Length of specimen, L 11.43 (cm). Diameter of specimen, D 10.16 (cm)

Area of specimen, A 81.07 (cm^2) Dry weight of specimen, $W_2 - W_1$ ______ g

Void ratio, e ______ G_s ______

Test No.	Average flow, Q (cm^3)	Time of collection, t (sec)	Temperature of water, T (°C)	Head difference, h (cm)	$k = \frac{QL}{Aht}$ (cm/sec)
3-9-87 11:05 am 1:00 pm	75	6,900	4° 1.57	863	2.7880×10^{-6}
1:00 PM 3:50 PM	100	10,200	4° 1.57	863	2.5146×10^{-6}
3:50 PM 7:50 pm	140	14,400	4° 1.57	863	2.4937×10^{-6}
7:50 pm 3-10-87 6:45 AM	388	39,300	3° 1.59	863	2.5646×10^{-6}
6:45 am 1:05 pm	263	~~75,600~~ 22,800	5° 1.54	863	~~4.24×10^{-6}~~ 2.9021×1
				AVE =	2.6186×10^{-6}

K =

$\frac{L}{Ah} = \frac{11.43}{81.07(863)} = Y$

$\therefore K = \frac{Q}{t}(Y)$

U.P. [illegible] ERI[illegible] D
ARCHITECTURAL
ASSOCIATES, Inc.
[illegible] MAIN STREET NORWAY, MI 49870

CONSTANT HEAD PERMEABILITY TEST

Description of soil Paper MILL SLudge

Sample No. Boring L Location 13'-15'

Length of specimen, L 11.43 (cm) Diameter of specimen, D 10.16 (cm)

Area of specimen, A 81.07 (cm^2) Dry weight of specimen, $W_2 - W_1$ ______ g

Void ratio, e ______ G_s ______

	Test No.	Average flow, Q (cm^3)	Time of collection, t (sec)	Temperature of water, T (°C)	Head difference, h (cm)	$k = \frac{QL}{Aht}$ × (cm/sec)	Temp Corr
/12/87	9:10 AM 10:00 AM	720	3000	1.52	863	1.0×10^{-4}	5.96×10
/12/87	10:05 AM 10:55 AM	665	3000	1.52	863	1.0×10^{-4}	5.505×10
/12/87	11:00 AM 11:50 AM	710	3000	1.52	863	1.0×10^{-4}	5.877×10
/12/87	11:55 12:45	750	3000	1.52	863	1.0×10^{-4}	6.208×10
/12/87	12:50 1:40	800	3000	1.54	863	1.0×10^{-4}	6.709×10
/12/87	1:45 2:45	990	3600	1.54	863	1.0×10^{-4}	6.919×10
	2:50 3:20	810	~~3000~~ 1800	1.54	863		6.79[illegible]
					Ave =	6.335×10^{-5}	

U.P. ENGINEERING AND ARCHITECTURAL ASSOCIATES, Inc.
411 MAIN STREET NORWAY, MI 49870

CONSTANT HEAD PERMEABILITY TEST

MAR 1 [illegible] 1987

Description of soil: PAPERMILL SLUDGE & ORGANIC MATERIAL (PEAT)

Sample No. (3) Boring M   Location 23'-25' (Soil sample taken 1-19-87)

Length of specimen, L 11.43 (cm)   Diameter of specimen, D 10.16 (cm)

Area of specimen, A 81.07 (cm^2)   Dry weight of specimen, $W_2 - W_1$ ______ g

Void ratio, e ______ G_s ______

	Test No.	Average flow, Q (cm^3)	Time of collection, t (sec)	Temperature of water, T (°C)		Head difference, h (cm)	$k = \frac{QL}{Aht}$ (cm/sec)
3-10-87	1:40 pm 4:00 pm	140	8,400	5°	1.54	863	4.193×10^{-6}
	4:00 pm 7:20 pm	180	12,000	4°	1.57	863	3.847×10^{-6}
3-11-87	7:20 pm 6:50 AM	560	41,400	4°	1.57	863	3.469×10^{-6}
	6:50 AM 9:05 AM	113	8,100	4°	1.57	863	3.578×10^{-6}
						*AVG. = 3.6313×10^{-6}	

$$\frac{L}{Ah} = Y = \frac{11.43}{81.07(863)} \quad \therefore K = (Y)\frac{Q}{t}$$

* Average equals total of all but the 1st one divided by N-1

Spec. ______ Producer ______

Sieve	Retained Fractional Weight	Retained Fractional Percent	Percents Cumulative Retained	Percents Cumulative Passing
2½"				
2"				
1½"				
1¼"				
1"				
¾"				
5/8"				
½"				
3/8"				
No. 4				
No. 8				
No. 10	0	0	0	100
~~No. 16~~ 20	0	0	0	100
No. 30	.1	0	0	100
No. 40	1.9	.1	.1	100
No. 50	131.3	7.9	8	92
No. 100	1430.4	85.6	93.6	6
~~Pan~~ 200	94.2	5.6	99.2	1
~~LBW~~ PAN	1.6			
~~Total~~ LBW	12	.8	100	0

Test No. 11 Date 3/10/87 Time AM PM

Initial Weight of Sample 1671.5 Gm.
Weight after Washing 1659.5 Gm.
Loss by Washing (Clay and Silt) .... Gm. .... %
Fineness Modulus ....
Crushed Material .... Gm. .... %
Organic Plate No. ....
Thin or Elongated Pieces .... Gm. .... %
Incrusted, more than 1/3 Area .... Gm. .... %
Incrusted, Total .... Gm. .... %
(1) Soft Particles .... Gm. .... %
(2) Chert .... Gm. .... %
Sum of (1) + (2) .... Gm. .... %

Material Meets or Fails ....
Remarks: ....

(Signed) ....
Plant Inspector

TOTAL 1671.5

WELL #2
2'-3'
Good clean redish brown sand

Spec. ____________ Producer ________________________________

Sieve	Retained Fractional Weight	Retained Fractional Percent	Percents Cumulative Retained	Percents Cumulative Passing
2½"				
2"				
1½"				
1¼"				
1"				
¾"				
5/8"				
½"				
3/8"				
No. 4				
No. 8				
No. 10	0.2	0.01%	0	100
No. ~~[illegible]~~ 20	1.0	0.1	.1	100
No. 30	8.6	0.7	.8	99
No. 40	98.1	7.7	8.5	92
No. 50	377.7	29.6	38.1	62
No. 100	707.4	55.5	93.6	6
~~[illegible]~~ 200	53.5	4.2	97.8	2
~~LBW~~ Pan	2.1			
~~Total~~ LBW	25.1	2.1	99.9	0
TOTAL	1273.7			

Test No. 1 | Date 3/6/97 | Time ______ AM PM

Initial Weight of Sample 1273.7 Gm.
Weight after Washing 1248.6 Gm.

Loss by Washing (Clay and Silt).......... Gm. .... %
Fineness Modulus ....
Crushed Material .... Gm. .... %
Organic Plate No. ....
Thin or Elongated Pieces .... Gm. .... %
Incrusted, more than 1/3 Area .... Gm. .... %
Incrusted, Total .... Gm. .... %
(1) Soft Particles .... Gm. .... %
(2) Chert .... Gm. .... %
Sum of (1) + (2) .... Gm. .... %

Material Meets or Fails ....
Remarks: ....

(Signed) ....
Plant Inspector

WELL NO. 4 0'-1' Monistique Paper
Brown Sand

Spec. ______ Producer ______

Sieve	Retained Fractional Weight	Retained Fractional Percent	Percents Cumulative Retained	Percents Cumulative Passing
2½"				
"				
1½"				
1¼"				
1"				
¾"				
5/8"				
½"				
3/8"				
No. 4				
No. 8				
No. 10 (1)	7.9	.7	.7	99
No. ~~20~~ 20	41.9	3.2	3.9	96
No. 30	11.1	.9	4.8	95
No. 40	11.9	.9	5.7	94
No. 50	28.1	2.1	7.8	92
No. 100	261.4	19.9	27.7	72
~~Pan~~ 200	659.2	50.4	78.1	22
~~LBW~~ PAN	117.1	8.9	87	
~~Total~~ LBW	169.9	13	100	0
TOTAL	1308.5			

Test No. 2 Date 3/6/87 Time AM PM

Initial Weight of Sample 1308.50 Gm.

Weight after Washing 1138.60 Gm.

Loss by Washing (Clay and Silt)........Gm. ....%

Fineness Modulus ....

Crushed Material ....Gm. ....%

Organic Plate No. ....

Thin or Elongated Pieces ....Gm. ....%

Incrusted, more than 1/3 Area..........Gm. ....%

Incrusted, Total..........Gm. ....%

(1) Soft Particles..........Gm. ....%

(2) Chert ....Gm. ....%

Sum of (1) + (2) ....Gm. ....%

Material Meets or Fails ....

Remarks: ....

(Signed) .... Plant Inspector

MANISTIQUE PAPER
WELL NO. 4 15'-16'
DARK SILTY SAND
WITH SOME ORGANIC
MATERIAL & some WOOD fibers

(1) WOOD CHIPS

Spec. ______ Producer ______

Sieve	Retained Fractional Weight	Retained Fractional Percent	Percents Cumulative Retained	Percents Cumulative Passing
2½"				
2"				
1½"				
1¼"				
1"				
¾"				
5/8"				
½"				
3/8"				
No. 4				
No. 8				
No. 10	4	.2	.2	100
No. 20	6.2	.4	.6	100
No. 30	18.8	1.1	1.7	98
No. 40	168.6	9.9	11.6	88
No. 50	489.4	28.8	40.4	60
No. 100	905.8	53.3	93.7	6
~~Pan~~ 200	99.1	5.8	99.5	0
~~LBW~~ PAN	2.40	.2		
~~Bowl~~ LBW	6.7	.4	100	0
TOTAL	1701			

Test No. 3 Date 3/6/87 Time AM PM

Initial Weight of Sample 1701.0 Gm.
Weight after Washing 1694.3 Gm.
Loss by Washing (Clay and Silt)........ Gm. .... %
Fineness Modulus ....
Crushed Material .... Gm. .... %
Organic Plate No. ....
Thin or Elongated Pieces .... Gm. .... %
Incrusted, more than 1/3 Area .... Gm. .... %
Incrusted, Total .... Gm. .... %
(1) Soft Particles .... Gm. .... %
(2) Chert .... Gm. .... %
Sum of (1) + (2) .... Gm. .... %

Material Meets or Fails ....
Remarks; ....

(Signed) ....
Plant Inspector

WELL #4 5'-6.5' MANISTIQUE PAPER

Brown SAnd

Spec. ______ Producer ______

Sieve	Retained Fractional Weight	Retained Fractional Percent	Percents Cumulative Retained	Percents Cumulative Passing
2½"				
2"				
1½"				
1¼"				
1"				
¾"				
5/8"				
½"				
3/8"				
No. 4				
No. 8				
No. 10	2.1	.1	.1	100
No. 20	2.7	.1	.2	100
No. 30	1.8	.1	.3	100
No. 40	27.6	1.5	1.8	98
No. 50	714.2	38.9	40.7	59
No. 100	1055.7	57.5	88.2	12
~~Pan~~ 200	18.3	1	99.2	1
~~LBW~~ Pan	1.1			
~~Total~~ LBW	11.2	.7	100	0

Test No. 7 Date 3/9/87 Time AM PM

Initial Weight of Sample 1834.7 Gm.
Weight after Washing 1823.5 Gm.
Loss by Washing (Clay and Silt) ...... Gm. ...... %
Fineness Modulus ......
Crushed Material ...... Gm. ...... %
Organic Plate No. ......
Thin or Elongated Pieces ...... Gm. ...... %
Incrusted, more than 1/3 Area ...... Gm. ...... %
Incrusted, Total ...... Gm. ...... %
(1) Soft Particles ...... Gm. ...... %
(2) Chert ...... Gm. ...... %
Sum of (1) + (2) ...... Gm. ...... %

Material Meets or Fails ......
Remarks: ......

(Signed) ......
Plant Inspector

TOTAL 1834.7

WELL # 1

Boring A

7'

Dark Brown Silty Sand
with some wood Fibers.

Spec.	Producer

Sieve	Retained Fractional		Percents Cumulative	
	Weight	Percent	Retained	Passing
2½"				
2"				
1½"				
1¼"				
1"				
¾"				
5/8"				
½"				
3/8"				
No. 4				
No. 8				
No. 10	0	0	0	100
No. 20	1.1	.1	.1	100
No. 30	7.4	.4	.5	99
No. 40	64.5	3.7	4.1	96
No. 50	349.2	19.9	24.0	76
No. 100	1153.4	65.6	89.6	10
~~Pan~~ 200	136.0	7.7	97.3	3
~~LBW~~ PAN	14.4	.8		
~~Total~~ LBW	32.2	1.8	100	0

TOTAL 1758.2

WELL#1

Boring A

15'

Brown Sand

Test No. 6 | Date 3/9/87 | Time AM PM

Initial Weight of Sample 1758.2 Gm.

Weight after Washing 1726.0 Gm.

Loss by Washing (Clay and Silt) .... Gm. .... %

Fineness Modulus ....

Crushed Material .... Gm. .... %

Organic Plate No. ....

Thin or Elongated Pieces .... Gm. .... %

Incrusted, more than 1/3 Area .... Gm. .... %

Incrusted, Total .... Gm. .... %

(1) Soft Particles .... Gm. .... %

(2) Chert .... Gm. .... %

Sum of (1) + (2) .... Gm. .... %

Material Meets or Fails ....

Remarks; ....

(Signed) ....

Plant Inspector

Spec. ____________ Producer ______________________________

Sieve	Retained Fractional		Percents Cumulative	
	Weight	Percent	Retained	Passing
2½"				
2"				
1½"				
1¼"				
1"				
¾"				
5/8"				
½"				
3/8"				
No. 4				
No. 8				
No. 10	239.2	12.7	12.7	87
No. 20	104	5.5	18.2	82
No. 30	41.9	2.2	20.4	80
No. 40	75.0	4	24.4	76
No. 50	135.3	7.2	31.6	68
No. 100	334.7	17.7	49.3	51
~~Pan~~ 200	147.5	7.8	57.1	43
~~LBW~~ Pan	75	4		
~~Total~~ LBW	735.9	39	100	0
TOTAL	1888.5			

Test No. 5 | Date 3/9/87 | Time AM PM

Initial Weight of Sample 1888.5 Gm.
Weight after Washing 1152.8 Gm.
Loss by Washing (Clay and Silt)........ Gm. .... %
Fineness Modulus ....
Crushed Material .... Gm. .... %
Organic Plate No. ....
Thin or Elongated Pieces .... Gm. .... %
Incrusted, more than 1/3 Area .... Gm. .... %
Incrusted, Total .... Gm. .... %
(1) Soft Particles .... Gm. .... %
(2) Chert .... Gm. .... %
Sum of (1) + (2) .... Gm. .... %

Material Meets or Fails ....
Remarks: ....

(Signed) ....
Plant Inspector

WELL #1 MANISTIQUE PAPER

Boring A

18' - 20'

Grayish Brown Silty Sand
Brown Clay
With some organic material
Some small stones ½" Dia and smaller

Spec. ________ Producer ________

Sieve	Retained Fractional Weight	Retained Fractional Percent	Percents Cumulative Retained	Percents Cumulative Passing
2½"				
2"				
1"				
¾"				
5/8"				
½"				
3/8"				
No. 4				
No. 8				
No. 10	1.30	.1	.1	100
No. ~~16~~ 20	8.6	.5	.6	99
No. 30	3.7	.2	.8	99
No. 40	10.0	.6	1.4	98
No. 50	40.0	2.3	3.7	96
No. 100	898.0	52.1	55.8	44
~~Pan~~ 200	503.8	29.2	85	15
~~LBW~~ Pan	115.6	6.7	91.7	
~~Total~~ LBW	142.6	8.3	100	0
TOTAL	1723.6			

Test No. 4 Date 3/6/87 Time ____ AM PM

Initial Weight of Sample 1723.6 Gm.
Weight after Washing 1581.0 Gm.
Loss by Washing (Clay and Silt) .... Gm. .... %
Fineness Modulus ....
Crushed Material .... Gm. .... %
Organic Plate No. ....
Thin or Elongated Pieces .... Gm. .... %
Incrusted, more than 1/3 Area .... Gm. .... %
Incrusted, Total .... Gm. .... %
(1) Soft Particles .... Gm. .... %
(2) Chert .... Gm. .... %
Sum of (1) + (2) .... Gm. .... %

Material Meets or Fails ....
Remarks; ....

(Signed) ....
Plant Inspector

Boring C

MANISTIQUE PAPER

5'- 6.5'

Brown Silty Sand

Spec. ____________ Producer ______________________________

Sieve	Retained Fractional Weight	Retained Fractional Percent	Percents Cumulative Retained	Percents Cumulative Passing
2½"				
2"				
'½"				
¼"				
1"				
¾"				
5/8"				
½"				
3/8"				
No. 4				
No. 8				
No. 10	0.70	0	0	100
~~No. 16~~ 20	2.30	.2	.2	100
No. 30	3.50	.3	.5	100
No. 40	26.0	1.9	2.4	98
No. 50	126.9	9.1	11.5	88
No. 100	646.5	46.3	57.8	42
~~Pan~~ 200	190.8	13.7	71.5	28
~~LBW~~ Pan	53.7			
~~Total~~ LBW	345.6	28.6	100	0

TOTAL 1396

Test No. 8 Date 3/9/87 Time AM PM

Initial Weight of Sample 1396.0 Gm.
Weight after Washing 1050.4 Gm.
Loss by Washing (Clay and Silt) .... Gm. .... %
Fineness Modulus ....
Crushed Material .... Gm. .... %
Organic Plate No. ....
Thin or Elongated Pieces .... Gm. .... %
Incrusted, more than 1/3 Area .... Gm. .... %
Incrusted, Total .... Gm. .... %
(1) Soft Particles .... Gm. .... %
(2) Chert .... Gm. .... %
Sum of (1) + (2) .... Gm. .... %

Material Meets or Fails ....
Remarks; ....

(Signed) ....
Plant Inspector

Boring F
1'-2'
Brown Silty Sand
with some organic
Material

Spec. ______ Producer ______

Sieve	Retained Fractional Weight	Retained Fractional Percent	Percents Cumulative Retained	Percents Cumulative Passing
2½"				
2"				
½"				
1¼"				
1"				
¾"				
5/8"				
½"				
3/8"				
No. 4				
No. 8				
No. 10	144.0	12.9	12.9	87
~~No.~~ 20	48.6	4.3	17.2	83
No. 30	20.7	1.8	19	81
No. 40	34.1	3.0	22	78
No. 50	60.8	5.4	27.4	73
No. 100	191.7	17.1	44.5	55
~~No.~~ 200	117.5	10.5	55	45
~~Pan~~ Pan	20.1			
~~Total~~ LBW	481.7	44.8	100	0

TOTAL: 1119.2

Test No. 10 Date 3/10/87 Time AM PM

Initial Weight of Sample 1119.2 Gm.
Weight after Washing 640.0 Gm.
Loss by Washing (Clay and Silt) .... Gm. .... %
Fineness Modulus ....
Crushed Material .... Gm. .... %
Organic Plate No. ....
Thin or Elongated Pieces .... Gm. .... %
Incrusted, more than 1/3 Area .... Gm. .... %
Incrusted, Total .... Gm. .... %
(1) Soft Particles .... Gm. .... %
(2) Chert .... Gm. .... %
Sum of (1) + (2) .... Gm. .... %

Material Meets or Fails ....
Remarks; ....

(Signed) ....
Plant Inspector

Boring F
5'- 5.5'
Grayish Brown Silty Sand
With some Clay. also
Some organic material.

Spec. ______ Producer ______

Sieve	Retained Fractional Weight	Retained Fractional Percent	Percents Cumulative Retained	Percents Cumulative Passing
2½"				
2"				
1½"				
1¼"				
1"				
¾"				
5/8"				
½"				
3/8"				
No. 4				
No. 8				
No. 10	0.0	0	0	100
~~No. 16~~ 20	1.5	.1	.1	100
No. 30	0.7	0	.1	100
No. 40	4.0	.3	.5	100
No. 50	36.5	2.8	3.3	97
No. 100	932.40	71.2	74.5	25
~~No.~~ 200	277.7	21.2	95.7	4
~~LBW~~ PAN	26.8			
~~Pan~~ LBW	29.9	4.3	100	0

TOTAL 1309.5

Test No. 9 Date 3/10/87 Time AM PM

Initial Weight of Sample 1309.5 Gm.
Weight after Washing 1279.6 Gm.
Loss by Washing (Clay and Silt) .... Gm. .... %
Fineness Modulus ....
Crushed Material .... Gm. .... %
Organic Plate No. ....
Thin or Elongated Pieces .... Gm. .... %
Incrusted, more than 1/3 Area .... Gm. .... %
Incrusted, Total .... Gm. .... %
(1) Soft Particles .... Gm. .... %
(2) Chert .... Gm. .... %
Sum of (1) + (2) .... Gm. .... %

Material Meets or Fails ....
Remarks; ....

(Signed) ....
Plant Inspector

Boring H.
4'-5'
Brown Sand

Spec. __________ Producer ____________________

Sieve	Retained Fractional		Percents Cumulative	
	Weight	Percent	Retained	Passing
2½"				
2"				
1½"				
1¼"				
1"				
¾"				
5/8"				
½"				
3/8"				
No. 4				
No. 8				
No. 10	52.0	13.2	13.2	87
~~No. 16~~ 20	36.7	9.3	22.5	77
No. 30	13.5	3.4	25.9	74
No. 40	17.4	4.4	30.3	70
No. 50	25.8	6.5	36.8	63
No. 100	91.0	23.1	59.9	40
~~Pan~~ 200	63.8	16.2	76.1	24
~~LBW~~ PAN	21.1			
Total LBW	73.3	239	100	0

TOTAL 394.6

Test No. 12 Date 3/10/87 Time AM PM

Initial Weight of Sample 394.6 Gm.
Weight after Washing 321.3 Gm.
Loss by Washing (Clay and Silt).......... Gm. .... %
Fineness Modulus ....
Crushed Material .... Gm. .... %
Organic Plate No. ....
Thin or Elongated Pieces .... Gm. .... %
Incrusted, more than 1/3 Area .... Gm. .... %
Incrusted, Total .... Gm. .... %
(1) Soft Particles .... Gm. .... %
(2) Chert .... Gm. .... %
Sum of (1) + (2) .... Gm. .... %

Material Meets or Fails ....
Remarks: ....

(Signed) ....
Plant Inspector

Boring H
10'-11'
grayish Brown Silty Sand.
stones 1/4" to 1/2" and smaller

APPENDIX B

HOUGHTON
NORWAY ESCANABA

U.P. ENGINEERING AND ARCHITECTURAL ASSOCIATES, Inc.
611 MAIN STREET, NORWAY, MI 49870 • (906) 563-5407

SOIL BORING LOG

SHEET ____ OF ____

CLIENT MANISTIQUE PAPERS PROJECT ________ JOB. NO. ________ DATE ________

OPERATOR ________ TECHNICIAN ________ EQUIPMENT DESCRIPTION ________

PENETRATION TEST INFORMATION: HAMMER WEIGHT ________ HAMMER FREE FALL ________

SPLIT SPOON SIZE - LENGTH ________ DIA. ________ OTHER INFORMATION ________

BORING NO.	BORING LOCATION AND SURFACE ELEVATION	DEPTH		BORING DESCRIPTION	W.L. (FT.)	PENETRATION TEST					
						DEPTH		NO. OF BLOWS			
		FROM	TO			FROM	TO	FIRST 6"	SECOND 6"	THIRD 6"	
	WELL #2	0	4	PEAT							
	1-12-87	4'	9'	GRAY SILT - HEAVY sample							
	HAND AUGER	9	10'	LAYER FINE SAND							
	540 N 1440 W	@	10'	TOUCH OF CLAY ON AUGER							
				.010 SCREEN 8'-10'							
	WELL #1	0	2'	WOOD SCRAPS + SLUDGE							
	BORING 'A'	2'	4'	WOOD SCRAPS + SLUDGE - PEAT STARTS @4' SAMPLE							
	1-13-87	4'	5'	PEAT							
	2483 N 840 W	5'	7'	WET SAND							
			7'	WET SAND - SAMPLE							
		7'	10'	SAND							
			10'	SAND - SAMPLE							
		10'	15'	SAND							
			15'	SAND - DARK - FINE - Sample							
		15'	18'	SAND							
		18'	20.5	SILTY CLAY W/SOME SMALL ROCKS - SAMPLE FROM AUGER							
			20.5	REFUSAL - APPEARS TO BE A							
				LAYER OF PEAT ABOVE CLAY							
				.020 SCREEN 10'-12'							

REMARKS: See reverse side.

HOUGHTON NORWAY ESCANABA

U.P. ENGINEERING AND ARCHITECTURAL ASSOCIATES, Inc.
611 MAIN STREET, NORWAY, MI 49870 • (906) 563-5407

SOIL BORING LOG

SHEET ____ OF ____

CLIENT Manistique Papers PROJECT ________ JOB. NO. ________ DATE ________

OPERATOR ________ TECHNICIAN ________ EQUIPMENT DESCRIPTION ________

PENETRATION TEST INFORMATION: HAMMER WEIGHT ________ HAMMER FREE FALL ________

SPLIT SPOON SIZE - LENGTH ________ DIA. ________ OTHER INFORMATION ________

BORING NO.	BORING LOCATION AND SURFACE ELEVATION	DEPTH FROM	DEPTH TO	BORING DESCRIPTION	W.L. (FT.)	PENETRATION TEST DEPTH FROM	PENETRATION TEST DEPTH TO	NO. OF BLOWS FIRST 6"	NO. OF BLOWS SECOND 6"	NO. OF BLOWS THIRD 6"	
	WELL #4	0	1'	SAND SAMPLE 9:00AM							
	1-20-87	1'	5'	SAND - RED - WET							
	0+10 N 1+0W	5'	6.5'	SAND - RED - WET Sample 9:20 AM							
		6.5	10'	SAND							
			10'	SAND Sample 9:45AM							
		10'	15'	SAND							
		15'	16'	15'-15.5' fine SAND, 15.5'-16' PEAT Sample 10:30 AM							
		16'	16.5	PEAT + SILT							
			16.5	REFUSAL							
				.010 SCREEN 10'-12'							
	B-6										
	BORING 'F'	0	1'	BLACK MUCK - TOPSOIL - WET							
	1-20-87	1'	2'	FINE SAND SAMPLE 12:00 PM							
	1+10N 4+0W	2'	5'	FINE SAND							
		5'	5.5	CLAYEY SAND, SM. ROCKS Sample 12:20 PM							
			5.5	REFUSAL							

REMARKS: See reverse side.

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NORWAY ESCANABA

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SOIL BORING LOG

SHEET ___ OF ___

CLIENT *MANISTIQUE PAPERS* PROJECT ________ JOB. NO. ________ DATE ________

OPERATOR ________ TECHNICIAN ________ EQUIPMENT DESCRIPTION ________

PENETRATION TEST INFORMATION: HAMMER WEIGHT ________ HAMMER FREE FALL ________

SPLIT SPOON SIZE - LENGTH ________ DIA. ________ OTHER INFORMATION ________

BORING NO.	BORING LOCATION AND SURFACE ELEVATION	DEPTH		BORING DESCRIPTION	W.L. (FT.)	PENETRATION TEST					
						DEPTH		NO. OF BLOWS			
		FROM	TO			FROM	TO	FIRST 6"	SECOND 6"	THIRD 6"	
	WELL #3	0	2'	RED SAND							
	1-13-87	2'	3'	SAND - WET - SAMPLE							
	20+0 N 12+0 W	3'	5'	SAND							
		5'	6'	SAND - FINE - SAMPLE							
		6'	6.5'	SAND							
		6.5	8'	ROCKY - SAND							
			8'	REFUSAL							
				.020 SCREEN 6'-8'							
	B-8										
	BORING 'H'	0	1'	SLUDGE - sample							
	1-13-87	1	3'	SLUDGE							
	20+0 N 10+0 W	3'	4'	SAND							
		4'	5'	SAND - sample							
		5'	8'	SAND - FINE							
		8'	9'	very Fine SILTY SAND							
		9'	10'	SOFT SILT - A TRACE OF PEAT @ 9'							
		10'	11	SILT + clayey GRAVEL - Sample							
		11	11.5	ROCKY							
			11.5	REFUSAL							

REMARKS: See reverse side.

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SOIL BORING LOG

SHEET ___ OF ___

CLIENT ____________ PROJECT ____________ JOB. NO. ____________ DATE ____________

OPERATOR ____________ TECHNICIAN ____________ EQUIPMENT DESCRIPTION ____________

PENETRATION TEST INFORMATION: HAMMER WEIGHT ____________ HAMMER FREE FALL ____________

SPLIT SPOON SIZE - LENGTH ____________ DIA. ____________ OTHER INFORMATION ____________

BORING NO.	BORING LOCATION AND SURFACE ELEVATION	DEPTH		BORING DESCRIPTION	W.L. (FT.)	PENETRATION TEST					
	B-11	FROM	TO			DEPTH FROM	DEPTH TO	NO. OF BLOWS FIRST 6"	SECOND 6"	THIRD 6"	
	BORING 'L'	0	2'	SLUDGE							
	1-15-87	2'	3'	SLUDGE SAMPLE 10:30AM							
	740N 1040W	3'	7'	SLUDGE - FLY ASH							
		7'	9.5'	SLUDGE - FLY ASH SAMPLE 11:00AM							
		9.5'	12'	DENSE SLUDGE, ASH, + WOOD SCRAP							
		12'	13'	SLUDGE Sample 11:30AM							
		13'	15'	SHELBY TUBE SAMPLE							
		15'	17'	DENSE SLUDGE							
		17'	18.5'	SLUDGE Sample 12:10PM							
		18.5'	22'	DENSE SLUDGE + ASH							
		22'	23.5'	SLUDGE + ASH Sample 2:15PM							
		23.5'	27'	DENSE SLUDGE + ASH							
		27'	28.5'	SLUDGE SAMPLE 2:45PM							
		28.5'	31'	SLUDGE							
		31'	32'	SAND							
		32'	33.5'	WET SILTY SAND - SAMPLE 3:20PM							
		33.5'	37'	SILT							
		37'	38.5'	37'-38' SILT, 38'-38.25' PEAT, 38.25'-38.5' fine Sand		SAMPLE 4:45PM					
		38.5'	42'	FINE SAND							
			42	REFUSAL							

REMARKS: See reverse side.

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611 MAIN STREET, NORWAY, MI 49870 • (906) 563-5407

SOIL BORING LOG

SHEET ____ OF ____

CLIENT Manistique Papers PROJECT ____________ JOB. NO. ________ DATE ________

OPERATOR ________ TECHNICIAN ________ EQUIPMENT DESCRIPTION ________

PENETRATION TEST INFORMATION: HAMMER WEIGHT ________ HAMMER FREE FALL ________

SPLIT SPOON SIZE - LENGTH ________ DIA. ________ OTHER INFORMATION ________

BORING NO.	BORING LOCATION AND SURFACE ELEVATION	DEPTH FROM	DEPTH TO	BORING DESCRIPTION	W.L. (FT.)	PENETRATION TEST DEPTH FROM	PENETRATION TEST DEPTH TO	NO. OF BLOWS FIRST 6"	NO. OF BLOWS SECOND 6"	NO. OF BLOWS THIRD 6"	
	B-9										
	BORING 'J'	0	2'	SLUDGE - sample							
	1-14-87	2'	7'	SLUDGE-WOOD SCRAP-FLY ASH							
	13+6 N 10+0 W	7'	8'	SLUDGE - sample							
		8'	9.6'	SHELBY TUBE sample							
		9.6	12'	SLUDGE - WOOD SCRAP							
		12'	13.3'	SLUDGE-FLY ASH @ 13' TOPSOIL - SAMPLE							
		13.3	17'	SOFT - SILTY FINE SAND							
		17	18.5	17'-18' SILTY FINE SAND, 18'-18.5' PEAT		SAMPLE					
		18.5	20	SOFT - SILTY FINE SAND - PEAT							
		20	21.5	ROCKY							
			21.5	REFUSAL - SOME CLAY ON BIT WHEN REMOVED							
	B-7										
	BORING 'G'	0	1'	SLUDGE							
	1-14-87	1'	2'	SLUDGE + TOPSOIL - SHELBY TUBE SAMPLE							
	18+0N 8+0W	2'	5'	ROCKY WITH SOME SILTY SAND							
			5'	REFUSAL - COMPOSITE Sample 2'-5' FROM AUGER							
	WELL #6	0	2'	SILTY FINE SAND SAMPLE							
	1-14-87	2'	3.5	ROCKY - WITH SOME SILTY SAND							
	MOVED 19+46N 0+68W		3.5'	REFUSAL .020 SCREEN 1.5'-3.5'							

REMARKS: See reverse side.

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SOIL BORING LOG

SHEET ___ OF ___

CLIENT MANISTIQUE PAPERS PROJECT ______ JOB. NO. ______ DATE ______

OPERATOR ______ TECHNICIAN ______ EQUIPMENT DESCRIPTION ______

PENETRATION TEST INFORMATION: HAMMER WEIGHT ______ HAMMER FREE FALL ______

SPLIT SPOON SIZE - LENGTH ______ DIA. ______ OTHER INFORMATION ______

BORING NO.	BORING LOCATION AND SURFACE ELEVATION	DEPTH FROM	DEPTH TO	BORING DESCRIPTION	W.L. (FT.)	PENETRATION TEST DEPTH FROM	PENETRATION TEST DEPTH TO	NO. OF BLOWS FIRST 6"	NO. OF BLOWS SECOND 6"	NO. OF BLOWS THIRD 6"	
	R-10										
	BORING 'K'	0	2'	FLY ASH + WOOD SCRAP							
	1-16-87	2'	3'	FLY ASH + WOOD SCRAP Sample 9:45 AM							
	6+0 N 6+0 W	3'	7'	ASH, WOOD, SLUDGE							
		7'	8.5'	ASH, WOOD, SLUDGE Sample 10:10 AM							
		8.5'	12'	ASH, WOOD, SLUDGE							
		12'	13'	SLUDGE SAMPLE 10:40 AM							
		13'	15'	SHELBY TUBE SAMPLE							
		15'	17'	SLUDGE - SOME WOOD SCRAP							
		17'	18.5'	SLUDGE - SOME ASH + WOOD SCRAP Sample 11:10 AM							
		18.5'	22'	SLUDGE							
		22'	23.5'	22'-23' SLUDGE (CLAYEY) 23'-23.5' FINE SAND SAMPLE 11:35 AM							
				ALSO A THIN LAYER of PEAT BETWEEN SLUDGE + SAND							
		23.5'	27'	SAND							
		27'	28.5'	FINE SAND + (TRACE of SLUDGE CARRIED BY BIT) Sample 11:55 AM							
		28.5'	32'	SAND							
		32'	33.5'	0.1' SAND 1.4' CLAYEY GRAVEL Sample 12:30 PM							
		33.5'	36'	CLAYEY GRAVEL							
			36'	REFUSAL							

REMARKS: See reverse side.

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SOIL BORING LOG

SHEET ___ OF ___

CLIENT MANISTIQUE PAPERS PROJECT ________ JOB. NO. ________ DATE ________

OPERATOR ________ TECHNICIAN ________ EQUIPMENT DESCRIPTION ________

PENETRATION TEST INFORMATION: HAMMER WEIGHT ________ HAMMER FREE FALL ________

SPLIT SPOON SIZE - LENGTH ________ DIA. ________ OTHER INFORMATION ________

BORING NO.	BORING LOCATION AND SURFACE ELEVATION B-12	DEPTH FROM	DEPTH TO	BORING DESCRIPTION	W.L. (FT.)	PENETRATION TEST DEPTH FROM	PENETRATION TEST DEPTH TO	NO. OF BLOWS FIRST 6"	NO. OF BLOWS SECOND 6"	NO. OF BLOWS THIRD 6"	
	BORING 'M'	0	2'	SLUDGE, FLY ASH							
	1-19-87	2'	3'	FLY ASH, SOME SLUDGE SAMPLE 12:00 PM							
	MOVED 8+0 N 8+0 W	3'	7'	SLUDGE, ASH, WOOD SCRAP							
		7'	8.5'	SLUDGE, ASH, WOOD SCRAP SAMPLE 12:40 PM							
		8.5	12'	SLUDGE, ASH, WOOD SCRAP							
		12'	13.5'	SLUDGE, ASH, WOOD SCRAP SAMPLE 1:05 PM							
		13.5	17'	SLUDGE, ASH, WOOD SCRAP							
		17'	18.5	SLUDGE, ASH, WOOD SCRAP SAMPLE 1:30 PM							
		18.5	22'	SLUDGE, WOOD SCRAP							
		22	23'	WET SLUDGE, WOOD SCRAP SAMPLE 2:00 PM							
		23'	25'	SHELBY TUBE SAMPLE							
		25'	27'	SLUDGE, WOOD SCRAP							
		27'	28.5'	WOOD SCRAP, SOME SLUDGE SAMPLE 2:45 PM							
		28.5	32'	SLUDGE, SOME WOOD SCRAP							
		32'	33.5'	SLUDGE, SOME WOOD SCRAP SAMPLE 3:10 PM							
		33.5	37'	SILT, FINE SAND							
		37'	38.5'	37'-38' SAND, 38'-38.5' SILTY FINE SAND SAMPLE 3:25 PM							
		38.5	42'	SOFT SILTY SAND							
		42'	43'	SAND SAMPLE 4:00 PM							
		43	47'	SOFT SAND							
			47'	REFUSAL - TRACE OF CLAY ON BIT WHEN REMOVED							

REMARKS: See reverse side.

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SOIL BORING LOG

SHEET ___ OF ___

CLIENT *Manistique Papers* PROJECT ______ JOB. NO. ______ DATE ______

OPERATOR ______ TECHNICIAN ______ EQUIPMENT DESCRIPTION ______

PENETRATION TEST INFORMATION: HAMMER WEIGHT ______ HAMMER FREE FALL ______

SPLIT SPOON SIZE - LENGTH ______ DIA. ______ OTHER INFORMATION ______

BORING NO.	BORING LOCATION AND SURFACE ELEVATION	DEPTH FROM	DEPTH TO	BORING DESCRIPTION	W.L. (FT.)	PENETRATION TEST DEPTH FROM	PENETRATION TEST DEPTH TO	NO. OF BLOWS FIRST 6"	NO. OF BLOWS SECOND 6"	NO. OF BLOWS THIRD 6"	
	B-3										
	BORING 'C'	0	2'	BLACK MUCK - WET							
	1-21-87	2	3.5'	PEAT sample 9:40 Am							
	MOVED 7+0N 12+70W	3.5'	4'	PEAT							
		4'	5'	SOFT SILTY SAND - WET							
		5'	6.5'	SILTY FINE SAND Sample 10:00 AM							
		6.5'	7'	SOFT SILTY SAND							
		7'	9'	FIRM SILTY SAND							
		9'	9.5	LOOSE - SILT							
			9.5	REFUSAL							
	B-4										
	BORING 'D'	0	1.5	BLACK MUCK - WET							
	1-21-87	1.5	2'	FINE SAND							
	MOVED 1+0N 12+35W	2'	3.5'	FINE SAND SAMPLE 10:50 AM							
		3.5'	5'	FINE SAND							
		5'	6.5'	FINE SAND SAMPLE 11:05 AM							
		6.5'	9'	FINE SAND							
			9'	REFUSAL							

REMARKS: See reverse side.

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SOIL BORING LOG

SHEET ___ OF ___

CLIENT MANISTIQUE PAPERS PROJECT ______ JOB. NO. ______ DATE ______

OPERATOR ______ TECHNICIAN ______ EQUIPMENT DESCRIPTION ______

PENETRATION TEST INFORMATION: HAMMER WEIGHT ______ HAMMER FREE FALL ______

SPLIT SPOON SIZE - LENGTH ______ DIA. ______ OTHER INFORMATION ______

BORING NO.	BORING LOCATION AND SURFACE ELEVATION	DEPTH		BORING DESCRIPTION	W.L. (FT.)	PENETRATION TEST				
						DEPTH		NO. OF BLOWS		
		FROM	TO			FROM	TO	FIRST 6"	SECOND 6"	THIRD 6"
	WELL #5	0	1'	BLACK MUCK-TOPSOIL-WET						
	1-20-87	1	2'	FINE SAND-WET Sample 2:00PM						
	11+0N 1+65W	2'	4'	FINE SAND						
		4'	5.5'	4'-5' FINE SILTY SAND, 5-5.5' SANDY CLAY Sample 2:15PM						
		5.5'	6'	SANDY CLAY W/SMALL ROCKS						
			6'	REFUSAL						
				.020 SCREEN 2'-4'						
	B-5									
	BORING 'E'	0	1	BLACK MUCK-TOPSOIL-WET						
	1-20-87	1'	2'	SAND-WET SAMPLE 3:00PM						
	6+0N 3+50W	2'	4'	SAND-FINE						
		4'	5'	SILTY FINE SAND SAMPLE 3:15PM						
		5'	7'	SILTY FINE SAND						
			7'	REFUSAL						

REMARKS: See reverse side.

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611 MAIN STREET, NORWAY, MI 49870 • (906) 563-5407

SOIL BORING LOG

SHEET ____ OF ____

CLIENT *MANISTIQUE Papers* PROJECT ________ JOB. NO. ________ DATE ________

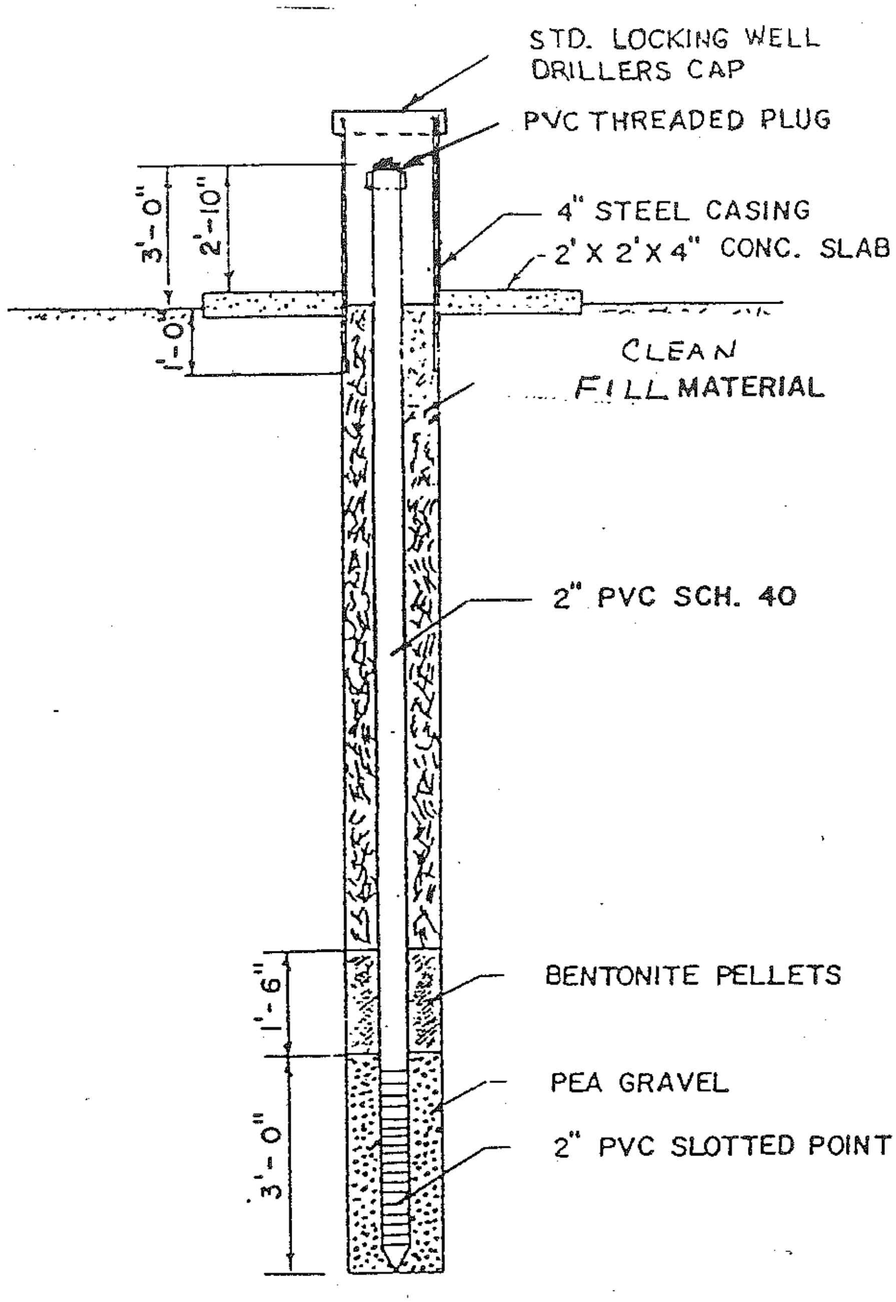
OPERATOR ________ TECHNICIAN ________ EQUIPMENT DESCRIPTION ________

PENETRATION TEST INFORMATION: HAMMER WEIGHT ________ HAMMER FREE FALL ________

SPLIT SPOON SIZE - LENGTH ________ DIA. ________ OTHER INFORMATION ________

BORING NO.	BORING LOCATION AND SURFACE ELEVATION B-2	DEPTH FROM	DEPTH TO	BORING DESCRIPTION	W.L. (FT.)	PENETRATION TEST DEPTH FROM	PENETRATION TEST DEPTH TO	NO. OF BLOWS FIRST 6"	NO. OF BLOWS SECOND 6"	NO. OF BLOWS THIRD 6"
	BORING 'B'	0	1'	WOOD SCRAPS - SAWDUST						
	1-20-87	1'	2'	SAND						
	moved 3+30 N 9+60 W	2'	3'	SAND - WET sample 4:40 PM						
		3'	7'	SAND - WET						
			7'	SAND SAMPLE 5:00 PM						
		7'	12'	SAND						
			12'	SAND sample 5:45 PM						
		12'	16'	SAND						
		16	17'	ROCKY						
			17'	REFUSAL - TRACE OF CLAY ON AUGER WHEN REMOVED						

REMARKS: See reverse side.



NOTE: IF DEPTH EXCEEDS 25', 1'-6" BENTONITE PLUG AT 25' INTERVALS.

DRAWN D.A.W CHECKED	TYPICAL MONITORING WELL DETAIL	FIG. 4
SCALE NONE FILE NO.	U.P. ENGINEERING AND ARCHITECTURAL ASSOCIATES, INC. 322 SHELDEN AVE. HOUGHTON MICHIGAN 49931 PHONE 906-482-4810 BRANCH OFFICE at NORWAY, MICHIGAN 49870 PHONE 906-563-5407	Job No.

APPENDIX C

ASTM WATER LEACHATE REPORT ON SOIL SAMPLES
FOR BITTNER ENGINEERING, INC.
ESCANABA, MICHIGAN

ESI #8703050
March, 1987

Western Michigan Environmental
Services, Inc.
245 East Lakewood Boulevard
Holland, Michigan 49424
616-396-1209

WESTERN MICHIGAN ENVIRONMENTAL SERVICES, INC.

PURPOSE

The purpose of this study is to evaluate the leachate produced from the solid sample submitted by Bittner Engineering, Escanaba, Michigan. The solid waste samples are subjected to a leaching procedure to assist in evaluating the groundwater contamination potential.

The method selected for use was the American Society for Testing and Materials (ASTM) D3987-85, Shake Extraction of Solid Waste with Water.

PROCEDURE

The solid samples were prepared for analysis by the procedure of ASTM D3987-85, Shake Extraction of Solid Waste with Water. The equipment utilized for the shake method was an Eberback, Model 5850, Reciprocating Shaker Power Unit, operating at a one inch stroke with 66 excursions per minute at ambient temperatures for 18 $\pm$ 0.25 hours. A one gallon (four liter) glass container was used for each sample. One hundred forty (140) grams of sample and 2,800 milliliters of deionized (DI) distilled water were used to process each sample. Following the shake procedure, the aqueous phase was separated by centrifugation, decantation, and filtration, yielding filtrate representative of the leachate. The leachates were then partitioned into appropriately preserved aliquots for analysis. The analytical procedures and/or instruments utilized were as follows:

pH	EPA Method 150.1 with a Fisher Acumet Meter.
Specific Conductance	Standard Methods Part 205.
Total Solids	ASTM Method D3987-85.
Oil and Grease	EPA Method 418.1.
Phenols, Total	EPA Method 420.1.
Metals, General	EPA Method 4.1.1-4.1.4 utilizing an Atomic Absorption Spectrophotometer* (dual beam with background correction).
Aluminum, dissolved	EPA Method 202.1.

Cadmium, dissolved	EPA Method 213.1.
Chromium, dissolved	EPA Method 218.2.
Copper, dissolved	EPA Method 220.1.
Iron, dissolved	EPA Method 236.1.
Lead, dissolved	EPA Method 239.2.
Zinc, dissolved	EPA Method 289.1.
PCB's	EPA Method 608.

*Atomic Absorption Spectrophotometer
Perkin Elmer Model 403 with an HGA 2000
Perkin Elmer Model 5000 with an HGA 500

WESTERN MICHIGAN ENVIRONMENTAL SERVICES, INC.

TABLE OF RESULTS - ASTM LEACHATE EVALUATION

Sample Identification: Boring "G" 2' - 5'
Submitted By: Bittner Engineering, Inc., Escanaba, Michigan
Date Received: March 9, 1987
ESI #: 87030504-7
Leaching Procedure Initiated: March 11, 1987
Results Reported: March 26, 1987

Results Expressed as milligrams per liter (mg/ℓ) except where noted in parentheses.

Parameter	Result
pH (s.u.)	7.5
Specific Conductance (µmhos/cm)	140
Oil and Grease	<1
Phenols, Total	0.006
Aluminum, dissolved	<0.25
Cadmium, dissolved	<0.01
Chromium, dissolved	<0.005
Copper, dissolved	<0.02
Iron, dissolved	0.15
Lead, dissolved	<0.005
Zinc, dissolved	0.041
PCB's (µg/ℓ)	<0.5

Original Sample:

Description: dark brown, clumpy moist fine-grained soil, with some fibrous material

Total Solids: 71.6% of sample

Storage Conditions: ambient

WESTERN MICHIGAN ENVIRONMENTAL SERVICES, INC.

TABLE OF RESULTS - ASTM LEACHATE EVALUATION

Sample Identification: Boring "J" Composite of three borings
Submitted By: Bittner Engineering, Inc., Escanaba, Michigan
Date Received: March 9, 1987
ESI #: 8703050-8
Leaching Procedure Initiated: March 11, 1987
Results Reported: March 26, 1987

Results Expressed as milligrams per liter (mg/ℓ) except where noted in parentheses.

Parameter	Result
pH (s.u.)	7.4
Specific Conductance (μmhos/cm)	55
Oil & Grease	<1
Phenols, Total	0.010
Aluminum, dissolved	<0.25
Cadmium, dissolved	<0.01
Chromium, dissolved	<0.005
Copper, dissolved	0.029
Iron, dissolved	0.099
Lead, dissolved	0.019
Zinc, dissolved	0.055
PCB's (μg/ℓ)	<0.5

Original Sample:

Description: gray/black moist crumbly fine-grained soil

Total Solids: 40.2% of sample

Storage Conditions: ambient

WESTERN MICHIGAN ENVIRONMENTAL SERVICES, INC.

TABLE OF RESULTS - ASTM LEACHATE EVALUATION

Sample Identification: Manistique Papers Landfill B - "K" Composite of five borings
Submitted By: Bittner Engineering, Inc., Escanaba, Michigan
Date Received: March 9, 1987
ESI #: 8703050-9
Leaching Procedure Initiated: March 11, 1987
Results Reported: March 26, 1987

Results Expressed as milligrams per liter (mg/ℓ) except where noted in parentheses.

Parameter	Result
pH (s.u.)	6.6
Specific Conductance (µmhos/cm)	300
Oil and Grease	<1
Phenols, Total	0.011
Aluminum, dissolved	<0.25
Cadmium, dissolved	<0.01
Chromium, dissolved	<0.005
Copper, dissolved	0.029
Iron, dissolved	0.32
Lead, dissolved	0.0076
Zinc, dissolved	17
PCB's (µg/ℓ)	<0.5

Original Sample:

Description: grayish/black, moist clay-like clumps (approximately 2 cm diameter

Total Solids: 48.2% of sample

Storage Conditions: ambient

WESTERN MICHIGAN ENVIRONMENTAL SERVICES, INC.

TABLE OF RESULTS - ASTM LEACHATE EVALUATION

Sample Identification: Manistique Papers Landfill B - "L" Composite of six borings
Submitted By: Bittner Engineering, Inc., Escanaba, Michigan
Date Received: March 9, 1987
ESI #: 8703050-10
Leaching Procedure Initiated: March 11, 1987
Results Reported: March 26, 1987

Results Expressed as milligrams per liter (mg/ℓ) except where noted in parentheses.

Parameter	Result
pH (s.u.)	7.4
Specific Conductance (µmhos/cm)	100
Oil and Grease	<1
Phenols, Total	0.054
Aluminum, dissolved	<0.25
Cadmium, dissolved	<0.01
Chromium, dissolved	<0.005
Copper, dissolved	<0.02
Iron, dissolved	<0.05
Lead, dissolved	<0.005
Zinc, dissolved	0.14
PCB's (µg/ℓ)	<0.5

Original Sample:

Description: gray, moist, clumpy, fine to medium grained soil

Total Solids: 38.3% of sample

Storage Conditions: ambient

WESTERN MICHIGAN ENVIRONMENTAL SERVICES, INC.

TABLE OF RESULTS - ASTM LEACHATE EVALUATION

Sample Identification: Manistique Papers Landfill B - "M" Composite of seven borings
Submitted By: Bittner Engineering, Inc., Escanaba, Michigan
Date Received: March 9, 1987
ESI #: 8703050-11
Leaching Procedure Initiated: March 11, 1987
Results Reported: March 26, 1987

Results Expressed as milligrams per liter (mg/ℓ) except where noted in parentheses.

Parameter	Result
pH (s.u.)	7.4
Specific Conductance (μmhos/cm)	140
Oil and Grease	<1
Phenols, Total	0.069
Aluminum, dissolved	<0.25
Cadmium, dissolved	<0.01
Chromium, dissolved	<0.005
Copper, dissolved	0.029
Iron, dissolved	<0.05
Lead, dissolved	<0.005
Zinc, dissolved	0.27
PCB's (μg/ℓ)	<0.5

Original Sample:

Description: light black friable, moist soil with some large pieces of fibrous material

Total Solids: 42.4% of sample

Storage Conditions: ambient

APPENDIX D

ESI
WESTERN MICHIGAN
ENVIRONMENTAL SERVICES, INC.
245 EAST LAKEWOOD BLVD.
HOLLAND, MI 49424-2066
PHONE 616-396-1209

TO: Bittner Engineering, Inc.
614 Ludington Street
Escanaba, Michigan 49829

Attn: Dennis Bittner

DATE: June 23, 1987

ANALYSIS: OF SOIL SAMPLES

REPORTED BY: Robert W. Hamm
Robert W. Hamm, Laboratory Director

SAMPLING DATE: Received from client on March 9, 1987.

RESULTS: Expressed as meq/100 g soil.

ESI #	SAMPLE I.D.	PARAMETER	CONCENTRATION
8703050-1	Well #1 Boring A 10'	CEC	3.10
-2	Well #2 5' - 6'	CEC	3.52
-3	Well #3 5' - 6'	CEC	2.11
-4	Well #4 10'	CEC	0.81
-5	Well #5 4' - 5.5'	CEC	5.49
-6	Well #6 0' - 2'	CEC	5.03
-7	Boring "G" 2' - 5'	See Attached Report	
-8	Boring "J" Composite of three borings	See Attached Report	
-9	Manistique Papers Landfill b - "K" Composite of five borings	See Attached Report	
-10	Manistique Papers Landfill B - "L" Composite of six borings	See Attached Report	
-11	Manistique Papers Landfill B - "M" Composite of seven borings	See Attached Report	

esi

WESTERN MICHIGAN
ENVIRONMENTAL SERVICES, INC.
245 EAST LAKEWOOD BLVD.
HOLLAND, MI 49424-2066
PHONE 616-396-1209

TO: Bittner Engineering, Inc.
614 Ludington
Escanaba, Michigan 49829

Attn: Dennis Bittner

DATE: June 26, 1987

ANALYSIS: OF WATER SAMPLES

REPORTED BY: Robert W. Hamm
Robert W. Hamm, Laboratory Director

SAMPLING DATE: Received from client on June 11, 1987.

RESULTS: Expressed as noted.

ESI #	SAMPLE I.D.	PARAMETER	CONCENTRATION
8706091-1	Well W-1	See Attached Table	
-2	Well W-2		
-3	Well W-3		
-4	Well W-4		
-5	Well W-5		
-6	Well W-6		
-7	Bailer Blank		

WESTERN MICHIGAN ENVIRONMENTAL SERVICES, INC.

TABLE 1
Results for Bittner Engineering, Inc.
Received June 11, 1987. Reported June 26, 1987.
Expressed as milligrams per liter (mg/ℓ) except where noted in parentheses.

Parameter	Well W-1	Well W-2	Well W-3	Well W-4	Well W-5	Well W-6	Bailer Blank
Bicarbonate	190	640	180	200	1000	770	<2
Alkalinity	160	540	160	170	880	620	<2
Chloride	7.2	12	<7	<7	30	53	<7
Sulfate	<1	<1	<1	<1	<1	<1	<1
Phenols, Total (µg/ℓ)	10.4	5.0	6.4	<5.0	51.6	—	<5.0
Iron, Dissolved	1.7	1.6	7.8	2.4	23	0.38	<0.05
Copper, Dissolved	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Lead, Dissolved	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Zinc, Dissolved	0.037	0.057	0.023	0.030	0.023	0.037	<0.020
Calcium, Dissolved	38	120	28	43	200	93	0.077
Sodium, Dissolved	3.0	7.2	1.4	1.3	22	13	0.14
Magnesium, Dissolved	15	42	18	9.6	63	58	0.042
Manganese, Dissolved	0.22	0.52	0.12	0.18	1.7	1.5	<0.02
TOC	38	40	40	20	56	26	<5
ESI #8706091	-1	-2	-3	-4	-5	-6	-7

Project Name: Manistique Papers, Inc. -Landfill

Name of Sampler (s): Bittner Eng. Inc. D. Bittner - L. Hough

ESI #	Date	Time	Mon. Well	Exist. Well	Surface Water	Wastewater	Waste	Other	Sample Location	Analyses Requested	No. of Cont.	Comments
8706091-1	6-8-87	1250	X						Well W-1	Iron, Copper, Lead, Zinc, Cd, Na, Mg, Cl, TOC, Sulfate, Phenols, Mn, Bicarb. Alk.	4	
-2	6-8-87	1315	X						Well W-2		4	
-3	6-8-87	1505	X						Well W-3		4	
-4	6-8-87	1430	X						Well W-4		4	
-5	6-8-87	1400	X						Well W-5		4	
-6	6-8-87	1530	X						Well W-6		3	No Phenols Sample
-7	6-8-87	1210						X	Bailer Blank		4	
8706096	6-5-87	1330						X	Dewatered Sludge	ASTM Leachate ~~pho~~ for the following: pH, Cond., O&G, T. Phenols, Dissolved Metals Al, Pb, Cd, Zn, Cr, Mn, Cu, Fe, PCB's, TOC	1	received 6/12/87 TKS

Remarks: All metals samples were filtered with .45 micron filter, except the bailer blank which was unfiltered
Report results to: Bittner Engineering, Inc. 614 Ludington Escanaba Mich 49829
Bill to: Manistique Papers P.O. Box 309 Manistique, Mich. 4985[illegible] Attn: Jim Cook

Samples Relinquished By:	Affiliation:	Time/Date	Samples Relinquished By:	Affiliation:	Time/Date
D. B. Bittner	Bittner Engineering	6/9/87 4:30pm			
Samples Transported By:	**Affiliation:**	**Time/Date**	**Samples Transported By:**	**Affiliation:**	**Time/Date**
Samples Received By:	**Affiliation:**	**Time/Date**	**Samples Received By:**	**Affiliation:**	**Time/Date**
Terri Bogeman	WMESI	3:00pm 6/11/87			

esi
WESTERN MICHIGAN
ENVIRONMENTAL SERVICES, INC.
245 EAST LAKEWOOD BLVD.
HOLLAND, MI 49424-2066
PHONE 616-396-1209

TO: Bittner Engineering, Inc.
614 Ludington
Escanaba, Michigan 49829

Attn: Dennis Bittner

DATE: August 19, 1987

ANALYSIS: OF WATER SAMPLE

REPORTED BY: Robert W. Hamm /kab
Robert W. Hamm, Laboratory Director

SAMPLING DATE: Received from client on July 23, 1987.

RESULTS: Expressed as milligrams per liter (mg/ℓ).

ESI #	SAMPLE I.D.	PARAMETER	CONCENTRATION
8707125	Well #7	Alkalinity	182
		Bicarbonate	250
		Chloride	11
		Sulfate	<1
		Phenol, Total	0.008
		Iron, Dissolved	6.9
		Copper, Dissolved	0.030
		Lead, Dissolved	<0.005
		Zinc, Dissolved	0.067
		Calcium, Dissolved	44
		Sodium, Dissolved	7.4
		Magnesium, Dissolved	18
		Manganese, Dissolved	1.0
		TOC	38

Project Name Mist. Papers

Name of Sampler (s): LDHough - M. [illegible]

ESI #	Date	Time	Sample Type (s): Mon. Well	Exist. Well	Surface Water	Wastewater	Waste	Other	Sample Location	Analyses Requested	No. of Cont.	Comments
870725	7/17		✓						Well #7	Alk, Bicarb, Cl, Sulfate		
										Total Phenol	4	
										Dissolved Fe,		
										Cu, Pb, Zn,		
										Ca, Na, Mg, Mn		
										TOC		

Remarks: Results to Bittner Eng. 614 Ludington, Esc,
Bill to Mst. Papers

Samples Relinquished By:	Affiliation:	Time/Date	Samples Relinquished By:	Affiliation:	Time/Dat
DBottner	Bittner Eng	7-2 4:50			
Samples Transported By:	**Affiliation:**	**Time/Date**	**Samples Transported By:**	**Affiliation:**	**Time/Dat**
Samples Received By:	**Affiliation:**	**Time/Date**	**Samples Received By:**	**Affiliation:**	**Time/Dat**
Terri Engeman	WMESI	1:00 pm 7/23/87			

APPENDIX E

ASTM WATER LEACHATE REPORT ON MANISTIQUE PAPERS DEWATERED SLUDGE
FOR
BITTNER ENGINEERING
ESCANABA, MICHIGAN

ESI #8706096
July, 1987

Western Michigan Environmental
Services, Inc.
245 East Lakewood Boulevard
Holland, Michigan 49424
616-396-1209

WESTERN MICHIGAN ENVIRONMENTAL SERVICES, INC.

PURPOSE

The purpose of this study is to evaluate the leachate produced from the solid sample submitted by Bittner Engineering, Escanaba, Michigan. The solid waste samples are subjected to a leaching procedure to assist in evaluating the groundwater contamination potential.

The method selected for use was the American Society for Testing and Materials (ASTM) D3987-85, Shake Extraction of Solid Waste with Water.

WESTERN MICHIGAN ENVIRONMENTAL SERVICES, INC.

PROCEDURE

The solid sample was prepared for analysis by the procedure of ASTM D3987-85, Shake Extraction of Solid Waste with Water. The equipment utilized for the extraction was an ESI Extraction Procedure Toxicity 6 solid waste rotary extractor operating as specified by the procedure at ambient temperatures for 18 $\pm$ 0.25 hours. A one gallon (four liter) glass container was used for each sample. One hundred forty (140) grams of sample and 2,800 milliliters of deionized (DI) distilled water were used to process each sample. Following the shake procedure, the aqueous phase was separated by centrifugation, decantation, and filtration, yielding filtrate representative of the leachate. The leachate was then partitioned into appropriately preserved aliquots for analysis. The analytical procedures and/or instruments utilized were as follows:

pH	EPA Method 150.1 with a Fisher Acumet Meter.
Specific Conductance	Standard Methods Part 205.
Oil and Grease	EPA Method 418.1.
Phenols, Total	EPA Method 420.1.
Metals, General	EPA Method 4.1.1-4.1.4 utilizing an Atomic Absorption Spectrophotometer* (dual beam with background correction).
Aluminum	EPA Method 202.1.
Cadmium	EPA Method 213.1.
Chromium, Total	EPA Method 218.2.
Copper	EPA Method 220.1.

Iron	EPA Method 236.1.
Lead	EPA Method 239.2.
Manganese	EPA Method 243.1.
Zinc	EPA Method 289.1.
Total Organic Carbon (TOC)	EPA Method 415.1.
PCB's	EPA Method 608.

*Atomic Absorption Spectrophotometer
Perkin Elmer Model 403 with an HGA 2000
Perkin Elmer Model 5000 with an HGA 500

WESTERN MICHIGAN ENVIRONMENTAL SERVICES, INC.

TABLE OF RESULTS - ASTM LEACHATE EVALUATION

Sample Identification: Manistique Papers Dewatered Sludge
Submitted By: Bittner Engineering, Escanaba, Michigan
Date Received: June 12, 1987
ESI #: 8706096
Leaching Procedure Initiated: June 23, 1987
Results Reported: July 9, 1987

Results Expressed as milligrams per liter (mg/ℓ) except where noted in parentheses.

Parameter	Result
pH (s.u.)	7.4
Specific Conductance (μmhos/cm)	350
Oil and Grease	7
Phenols, Total	0.190
Aluminum, dissolved	<0.25
Cadmium, dissolved	<0.01
Chromium, dissolved	<0.005
Copper, dissolved	<0.02
Iron, dissolved	<0.05
Lead, dissolved	<0.005
Manganese, dissolved	0.056
Zinc, dissolved	0.13
Total Organic Carbon	60
PCB's	<0.1

Original Sample:

Description (color, texture, particle size): medium grey, clumpy solids

Total Solids (% of sample): 38.9

Storage Conditions: room temperature

APPENDIX F

ASTM WATER LEACHATE REPORTS
SAMPLE K
SAMPLE L
SAMPLE M
ASH SAMPLE
FOR
BITTNER ENGINEERING, INC.
ESCANABA, MICHIGAN

ESI #8707145-1
August, 1987

Western Michigan Environmental
Services, Inc.
245 East Lakewood Boulevard
Holland, Michigan 49424
616-396-1209

WESTERN MICHIGAN ENVIRONMENTAL SERVICES, INC.

PURPOSE

The purpose of this study is to evaluate the leachate produced from the solid sample submitted by Bittner Engineering, Escanaba, Michigan. The solid waste samples are subjected to a leaching procedure to assist in evaluating the groundwater contamination potential.

The method selected for use was the American Society for Testing and Materials (ASTM) D3987-85, Shake Extraction of Solid Waste with Water.

WESTERN MICHIGAN ENVIRONMENTAL SERVICES, INC.

PROCEDURE

The solid waste samples were prepared for analysis by the procedure of ASTM D3987-85, Shake Extraction of Solid Waste with Water. The equipment utilized for the extraction was an ESI Extraction Procedure Toxicity 6 solid waste rotary extractor operating as specified by the procedure at ambient temperatures for 18 $\pm$ 0.25 hours. A one gallon (four liter) glass container was used for each sample. One hundred forty (140) grams of sample and 2,800 milliliters of deionized (DI) distilled water were used to process each sample. Following the shake procedure, the aqueous phase was separated by centrifugation, decantation, and filtration, yielding filtrate representative of the leachate. The leachates were then partitioned into appropriately preserved aliquots for analysis. The analytical procedures utilized were as follows:

pH	EPA Method* 150.1
Specific Conductance	Standard Methods for the Examination of Water and Wastewater, 16th edition Part 205.
Oil and Grease	EPA Method* 418.1.
Phenols, Total	EPA Method* 420.1.
Aluminum	EPA Method* 202.1.
Cadmium	EPA Method* 213.1.
Chromium, Total	EPA Method* 218.2.
Copper	EPA Method* 220.1.
Iron	EPA Method* 236.1.
Lead	EPA Method* 239.2.
Manganese	EPA Method* 243.1.
Zinc	EPA Method* 289.1.
Total Organic Carbon (TOC)	EPA Method* 415.1.
PCB's	EPA Method 608.

*U.S. EPA Methods for Chemical Analysis of Water and Wastes, March, 1983.

WESTERN MICHIGAN ENVIRONMENTAL SERVICES, INC.

TABLE OF RESULTS - ASTM LEACHATE EVALUATION

Sample Identification: Sample K
Submitted By: Bittner Engineering
Date Received: July 28, 1987
ESI #: 8707145-1
Leaching Procedure Initiated: August 5, 1987
Results Reported: August 27, 1987

Results expressed as milligrams per liter (mg/ℓ).

Parameter	Result
Manganese	0.066
Total Organic Carbon (TOC)	57

Original Sample:

Description (color, texture, particle size): Medium grey, very small fibers & dust, packed; dust grains to approximately one inch.

Total Solids (% of sample): 92.6

Storage Conditions: Original sample at room temperature. Leachate at 4 °C.

WESTERN MICHIGAN ENVIRONMENTAL SERVICES, INC.

TABLE OF RESULTS - ASTM LEACHATE EVALUATION

Sample Identification: Sample L
Submitted By: Bittner Engineering
Date Received: July 28, 1987
ESI #: 8707145-2
Leaching Procedure Initiated: August 5, 1987
Results Reported: August 27, 1987

Results expressed as milligrams per liter (mg/ℓ).

Parameter	Result
Manganese	<0.02
Total Organic Carbon (TOC)	44

Original Sample:

Description (color, texture, particle size): Medium grey, moist small packed fibers; size varies from one millimeter to 1 inch.

Total Solids (% of sample): 40.2

Storage Conditions: Original sample at room temperature. Leachate at 4 °C.

WESTERN MICHIGAN ENVIRONMENTAL SERVICES, INC.

TABLE OF RESULTS - ASTM LEACHATE EVALUATION

Sample Identification: Sample M
Submitted By: Dittner Engineering
Date Received: July 28, 1987
ESI #: 8707145-3
Leaching Procedure Initiated: August 6, 1987
Results Reported: August 27, 1987

Results Expressed as milligrams per liter (mg/ℓ).

Parameter	Result
Manganese	0.028
Total Organic Carbon (TOC)	19

Original Sample:

Description (color, texture, particle size): Packed medium grey, moist small fibers, varying in size from approximately one millimeter to 2.6 millimeters.

Total Solids (% of sample): 36.7

Storage Conditions: Original sample at room temperature. Leachate at 4 °C.

WESTERN MICHIGAN ENVIRONMENTAL SERVICES, INC.

TABLE OF RESULTS - ASTM LEACHATE EVALUATION

Sample Identification: Ash Sample
Submitted By: Bittner Engineering
Date Received: July 28, 1987
ESI #: 8707145-4
Leaching Procedure Initiated: August 6, 1987
Results Reported: August 27, 1987

Results expressed as milligrams per liter (mg/ℓ) except where noted in parentheses.

Parameter	Result
pH (s.u.)	9.7
Specific Conductance (µmhos/cm)	300
Oil and Grease	<3
Phenols, Total	<0.005
Aluminum	1.8
Cadmium	<0.01
Chromium, Total	<0.005
Copper	<0.02
Iron	<0.05
Lead	<0.005
Manganese	<0.02
Zinc	<0.02
Total Organic Carbon	<5
PCB's (µg/ℓ)	<1.0

Original Sample:

Description (color, texture, particle size): Dark grey/black soil and dust grains; size to approximately five millimeters.

Total Solids (% of sample): 97.5

Storage Conditions: Original sample at room temperature. Leachate at 4 °C.

APPENDIX G

THOMAS P. O'BRIEN
226 N. Houghton
Manistique, Michigan 49854
Registered Land
P.O. Box 252
Phone 906-341-20

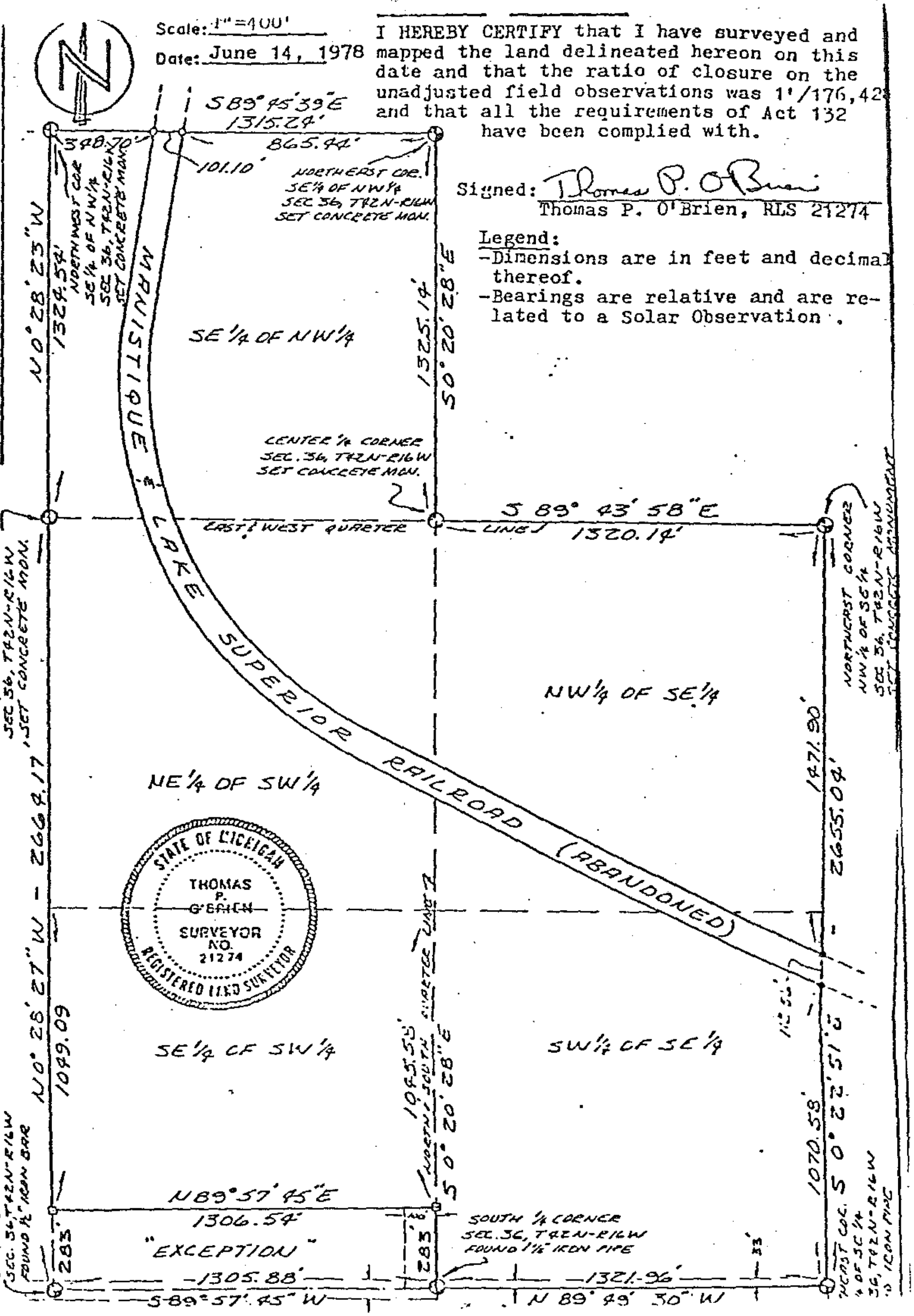
Scale: 1"=400'

Date: June 14, 1978

I HEREBY CERTIFY that I have surveyed and mapped the land delineated hereon on this date and that the ratio of closure on the unadjusted field observations was 1'/176,42 and that all the requirements of Act 132 have been complied with.

Signed: Thomas P. O'Brien
Thomas P. O'Brien, RLS 21274

Legend:
-Dimensions are in feet and decimal thereof.
-Bearings are relative and are related to a Solar Observation.



ASTM WATER LEACHATE REPORT ON SOIL SAMPLES
FOR U.P. ENGINEERING
ESCANABA, MICHIGAN

ESI #8703050
March, 1987

Western Michigan Environmental
Services, Inc.
245 East Lakewood Boulevard
Holland, Michigan 49424
616-396-1209

PURPOSE

The purpose of this study is to evaluate leachates produced from solid waste samples submitted by U.P. Engineering, Escanaba, Michigan. The solid waste samples are subjected to a leaching procedure to assist in evaluating the groundwater contamination potential in order to classify the solid waste as appropriate for disposal in a type III landfill. These evaluations are done in accordance with the criteria set forth in the Solid Waste Management Act, Act No. 641, Public Acts of 1978, and the accompanying Administrative Rules.

The method selected for use was the American Society for Testing and Materials (ASTM) D3987-85, Shake Extraction of Solid Waste with Water.

PROCEDURE

The solid samples were prepared for analysis by the procedure of ASTM D3987-85, Shake Extraction of Solid Waste with Water. The equipment utilized for the shake method was an Eberback, Model 5850, Reciprocating Shaker Power Unit, operating at a one inch stroke with 66 excursions per minute at ambient temperatures for 18 $\pm$ 0.25 hours. A one gallon (four liter) glass container was used for each sample. One hundred forty (140) grams of sample and 2,800 milliliters of deionized (DI) distilled water were used to process each sample. Following the shake procedure, the aqueous phase was separated by centrifugation, decantation, and filtration, yielding filtrate representative of the leachate. The leachates were then partitioned into appropriately preserved aliquots for analysis. The analytical procedures and/or instruments utilized were as follows:

pH	EPA Method 150.1 with a Fisher Acumet Meter.
Specific Conductance	Standard Methods Part 205.
Total Solids	ASTM Method D3987-85.
Oil and Grease	EPA Method 418.1.
Phenols, Total	EPA Method 420.1.
Metals, General	EPA Method 4.1.1-4.1.4 utilizing an Atomic Absorption Spectrophotometer* (dual beam with background correction).
Aluminum, dissolved	EPA Method 202.1.

Cadmium, dissolved	EPA Method 213.1.
Chromium, dissolved	EPA Method 218.2.
Copper, dissolved	EPA Method 220.1.
Iron, dissolved	EPA Method 236.1.
Lead, dissolved	EPA Method 239.2.
Zinc, dissolved	EPA Method 289.1.
PCB's	EPA Method 608.

*Atomic Absorption Spectrophotometer
Perkin Elmer Model 403 with an HGA 2000
Perkin Elmer Model 5000 with an HGA 500

TABLE OF RESULTS - ASTM LEACHATE EVALUATION

Sample Identification: Boring "G" 2' - 5'
Submitted By: U.P. Engineering, Escanaba, Michigan
Date Received: March 9, 1987
ESI #: 8703050-7
Leaching Procedure Initiated: March 11, 1987
Results Reported: March 26, 1987

Results Expressed as milligrams per liter (mg/ℓ) except where noted in parentheses.

Parameter	Result
pH (s.u.)	7.5
Specific Conductance (μmhos/cm)	140
Oil and Grease	<1
Phenols, Total	0.006
Aluminum, dissolved	<0.25
Cadmium, dissolved	<0.01
Chromium, dissolved	<0.005
Copper, dissolved	<0.02
Iron, dissolved	0.15
Lead, dissolved	<0.005
Zinc, dissolved	0.041
PCB's (μg/ℓ)	<0.5

Original Sample:

Description: dark brown, clumpy moist fine-grained soil, with some fibrous material

Total Solids: 71.6% of sample

Storage Conditions: ambient

TABLE OF RESULTS - ASTM LEACHATE EVALUATION

Sample Identification: Boring "J" Composite of three borings
Submitted By: U.P. Engineering, Escanaba, Michigan
Date Received: March 9, 1987
ESI #: 8703050-8
Leaching Procedure Initiated: March 11, 1987
Results Reported: March 26, 1987

Results Expressed as milligrams per liter (mg/ℓ) except where noted in parentheses.

Parameter	Result
pH (s.u.)	7.4
Specific Conductance (umhos/cm)	55
Oil & Grease	<1
Phenols, Total	0.010
Aluminum, dissolved	<0.25
Cadmium, dissolved	<0.01
Chromium, dissolved	<0.005
Copper, dissolved	0.029
Iron, dissolved	0.099
Lead, dissolved	0.019
Zinc, dissolved	0.055
PCB's (µg/ℓ)	<0.5

Original Sample:

Description: gray/black moist crumbly fine-grained soil

Total Solids: 40.2% of sample

Storage Conditions: ambient

TABLE OF RESULTS - ASTM LEACHATE EVALUATION

Sample Identification: Manistique Papers Landfill B - "K" Composite of five borings
Submitted By: U.P. Engineering, Escanaba, Michigan
Date Received: March 9, 1987
ESI #: 8703050-9
Leaching Procedure Initiated: March 11, 1987
Results Reported: March 26, 1987

Results Expressed as milligrams per liter (mg/ℓ) except where noted in parentheses.

Parameter	Result
pH (s.u.)	6.6
Specific Conductance (µmhos/cm)	300
Oil and Grease	<1
Phenols, Total	0.011
Aluminum, dissolved	<0.25
Cadmium, dissolved	<0.01
Chromium, dissolved	<0.005
Copper, dissolved	0.029
Iron, dissolved	0.32
Lead, dissolved	0.0076
Zinc, dissolved	17
PCB's (µg/ℓ)	<0.5

Original Sample:

Description: grayish/black, moist clay-like clumps (approximately 2 cm diameter

Total Solids: 48.2% of sample

Storage Conditions: ambient

TABLE OF RESULTS - ASTM LEACHATE EVALUATION

Sample Identification: Manistique Papers Landfill B - "L" Composite of six borings
Submitted By: U.P. Engineering, Escanaba, Michigan
Date Received: March 9, 1987
ESI #: 8703050-10
Leaching Procedure Initiated: March 11, 1987
Results Reported: March 26, 1987

Results Expressed as milligrams per liter (mg/ℓ) except where noted in parentheses.

Parameter	Result
pH (s.u.)	7.4
Specific Conductance (μmhos/cm)	100
Oil and Grease	<1
Phenols, Total	0.054
Aluminum, dissolved	<0.25
Cadmium, dissolved	<0.01
Chromium, dissolved	<0.005
Copper, dissolved	<0.02
Iron, dissolved	<0.05
Lead, dissolved	<0.005
Zinc, dissolved	0.14
PCB's (μg/ℓ)	<0.5

Original Sample:

Description: gray, moist, clumpy, fine to medium grained soil

Total Solids: 38.3% of sample

Storage Conditions: ambient

TABLE OF RESULTS - ASTM LEACHATE EVALUATION

Sample Identification: Manistique Papers Landfill B - "M" Composite of seven borings
Submitted By: U.P. Engineering, Escanaba, Michigan
Date Received: March 9, 1987
ESI #: 8703050-11
Leaching Procedure Initiated: March 11, 1987
Results Reported: March 26, 1987

Results Expressed as milligrams per liter (mg/ℓ) except where noted in parentheses.

Parameter	Result
pH (s.u.)	7.4
Specific Conductance (μmhos/cm)	140
Oil and Grease	<1
Phenols, Total	0.069
Aluminum, dissolved	<0.25
Cadmium, dissolved	<0.01
Chromium, dissolved	<0.005
Copper, dissolved	0.029
Iron, dissolved	<0.05
Lead, dissolved	<0.005
Zinc, dissolved	0.27
PCB's (μg/ℓ)	<0.5

Original Sample:

Description: light black friable, moist soil with some large pieces of fibrous material

Total Solids: 42.4% of sample

Storage Conditions: ambient